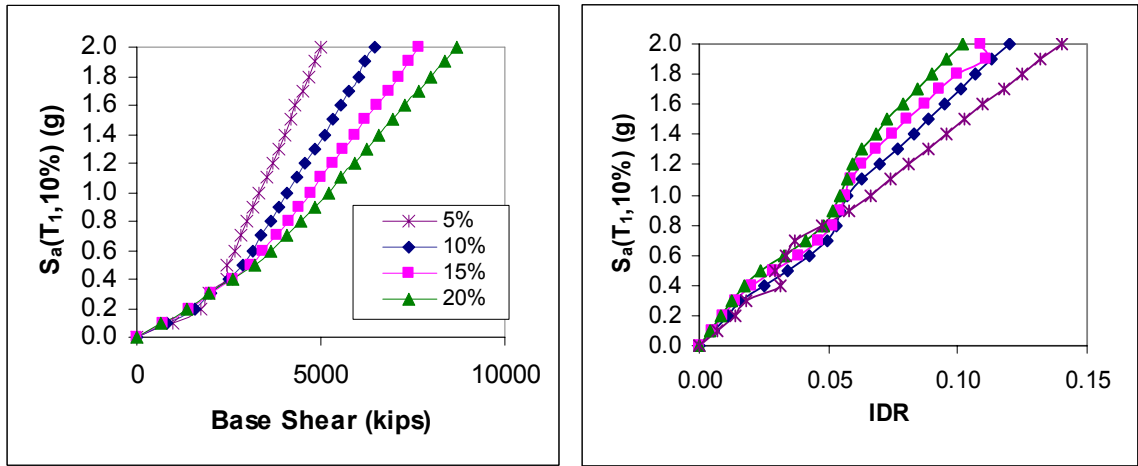


## **Appendix B: IDA Plots**

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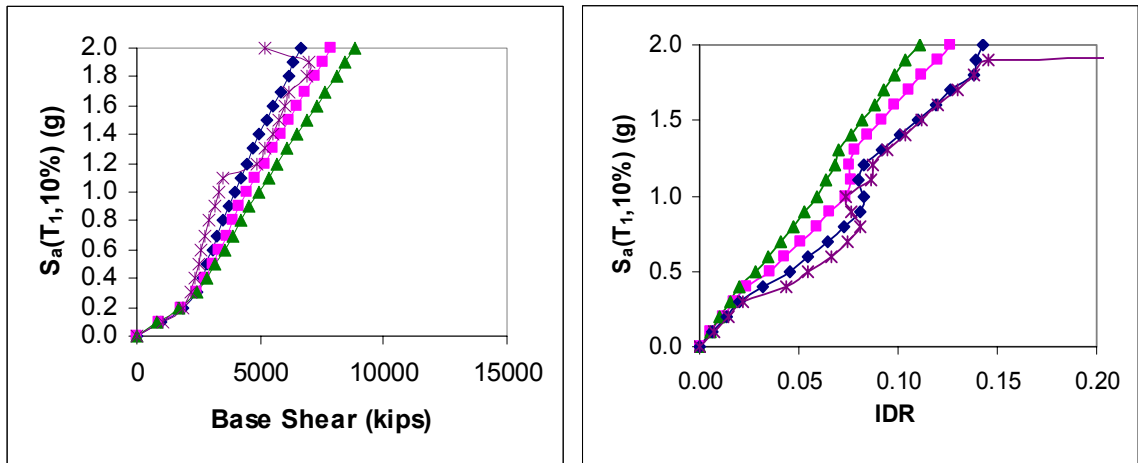
**B.1 Peak Base Shear and Drift IDA Curves for 5-20% Critically Damped Structure with Linear Dampers**



(a)

(b)

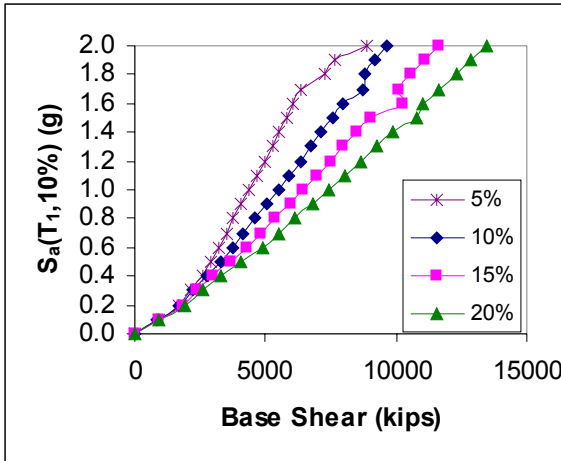
**Figure B.1 (a-b): IDA Curves for 5-20% Critical Damping LA01**



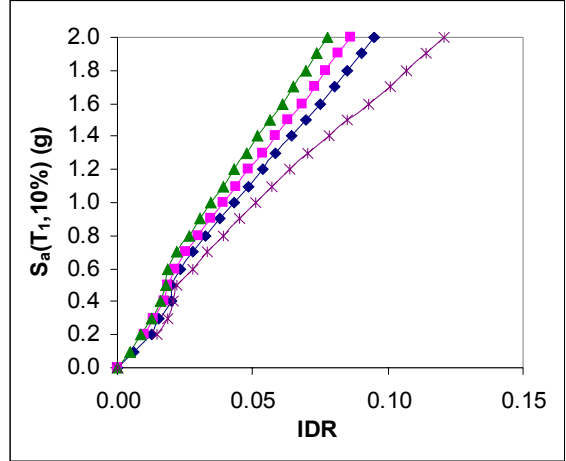
(a)

(b)

**Figure B.2 (a-b): IDA Curves for 5-20% Critical Damping LA07**

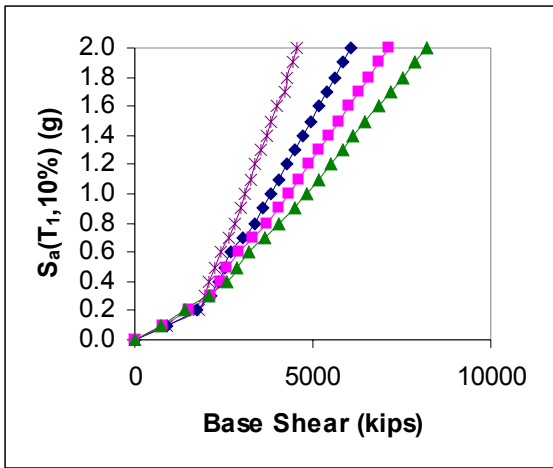


(a)

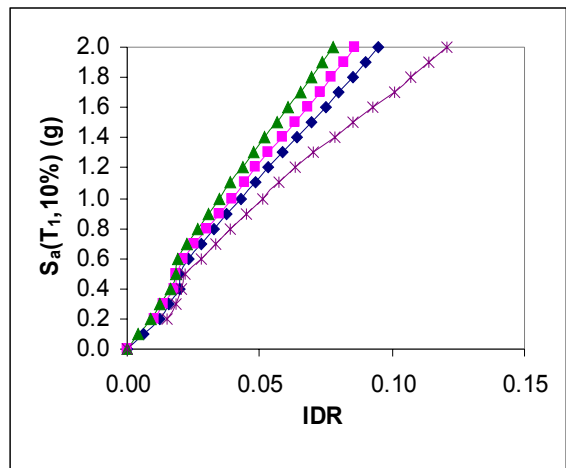


(b)

Figure B.3 (a-b): IDA Curves for 5-20% Critical Damping LA10

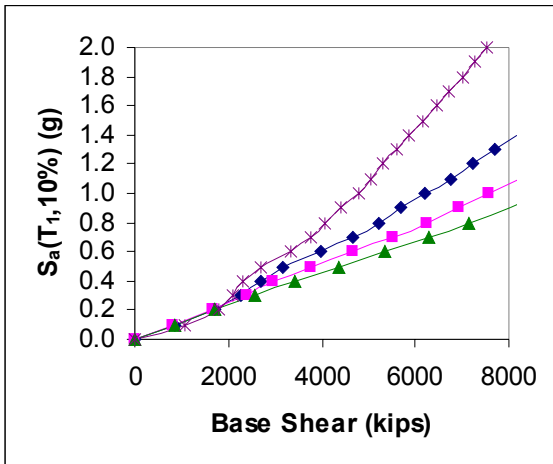


(a)

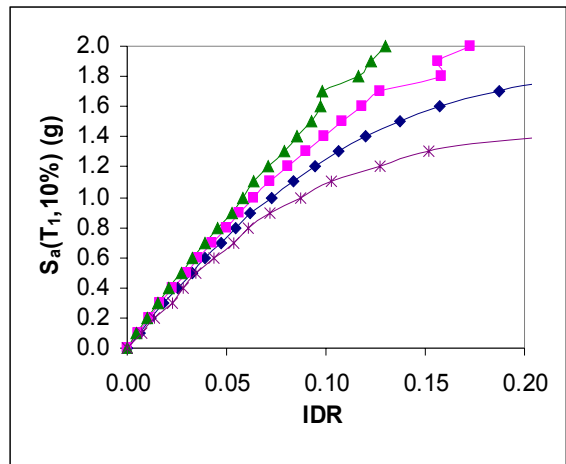


(b)

Figure B.4 (a-b): IDA Curves for 5-20% Critical Damping LA10

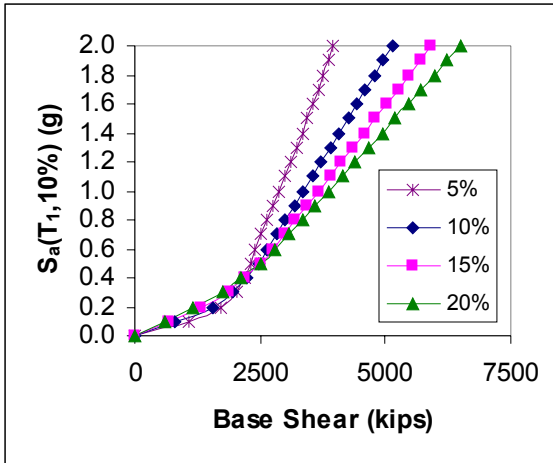


(a)

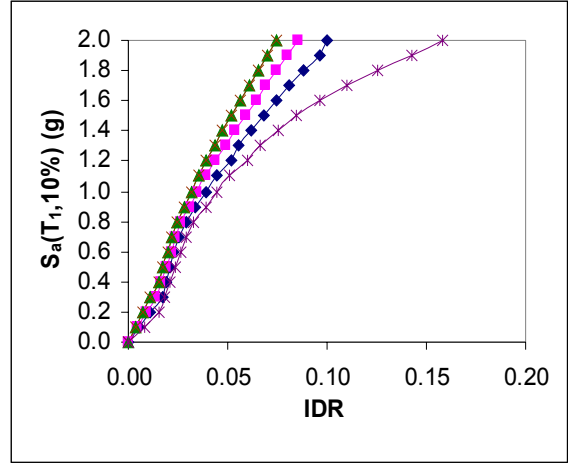


(b)

Figure B.5 (a-b): IDA Curves for 5-20% Critical Damping LA13

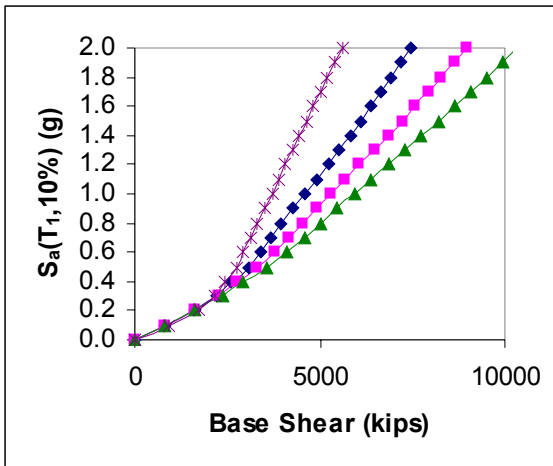


(a)

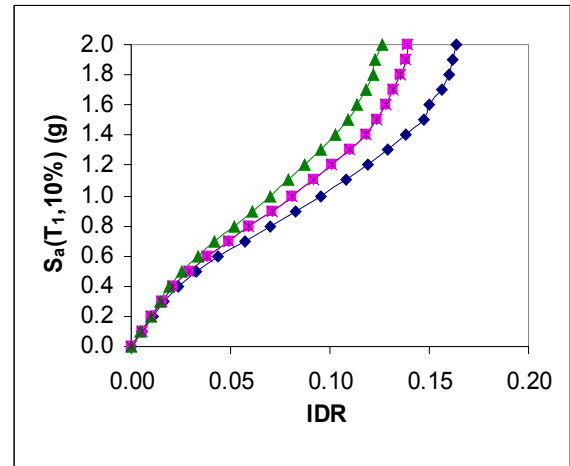


(b)

Figure B.6 (a-b): IDA Curves for 5-20% Critical Damping LA17

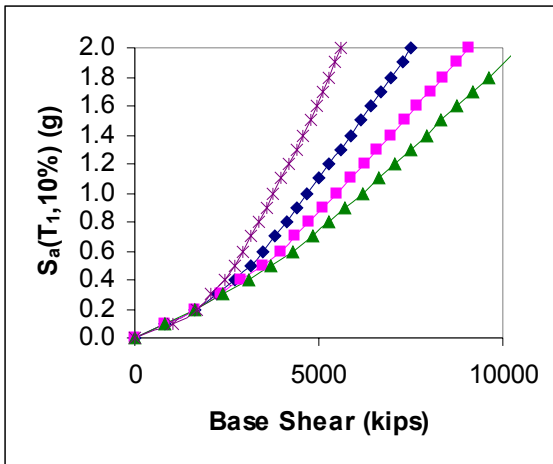


(a)

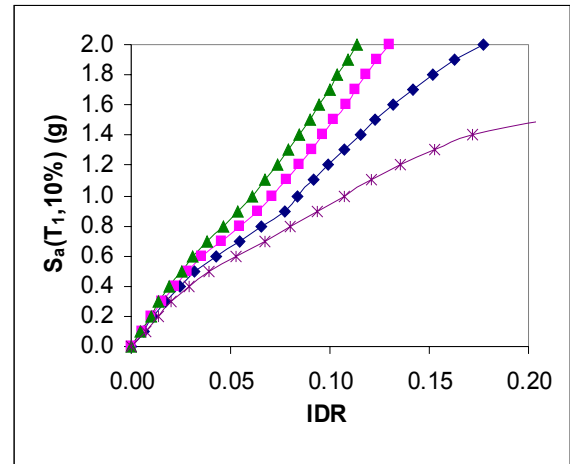


(b)

Figure B.7 (a-b): IDA Curves for 5-20% Critical Damping NF01

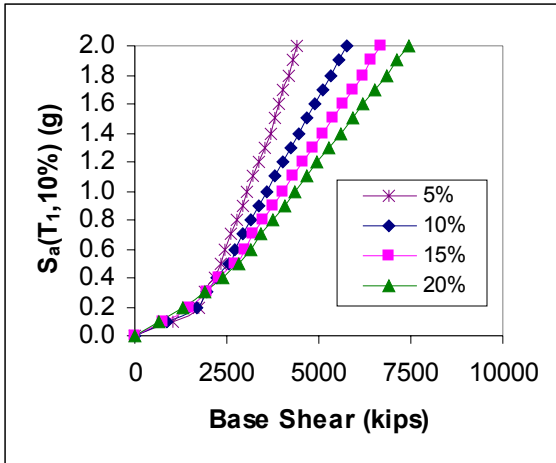


(a)

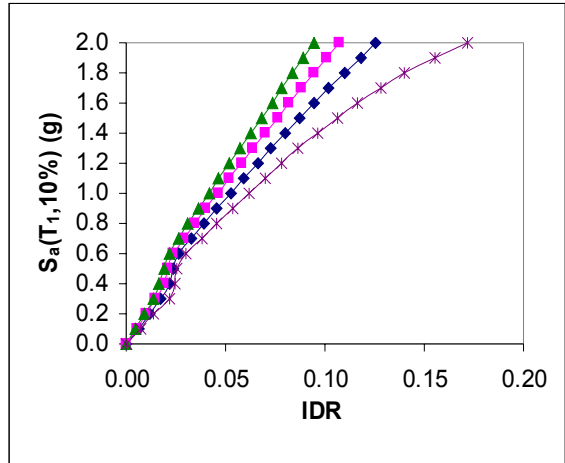


(b)

Figure B.8 (a-b): IDA Curves for 5-20% Critical Damping NF07

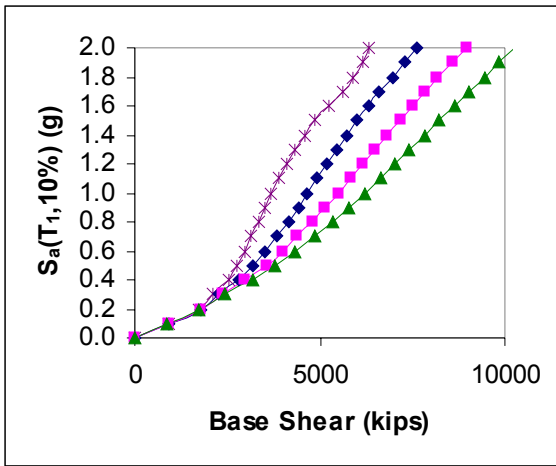


(a)

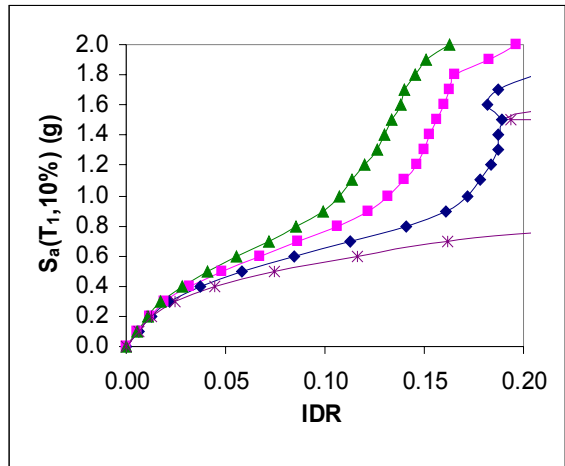


(b)

Figure B.9 (a-b): IDA Curves for 5-20% Critical Damping NF09

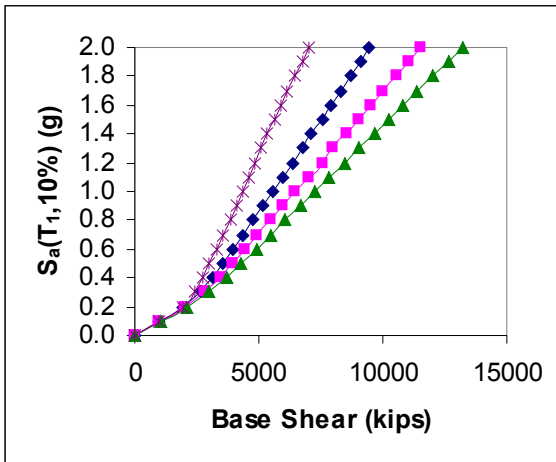


(a)

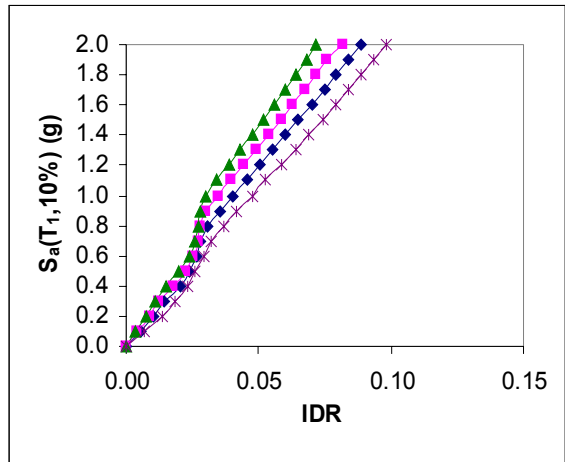


(b)

Figure B.10 (a-b): IDA Curves for 5-20% Critical Damping NF11

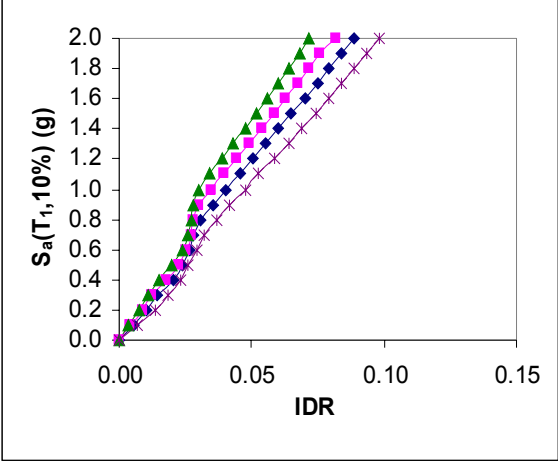
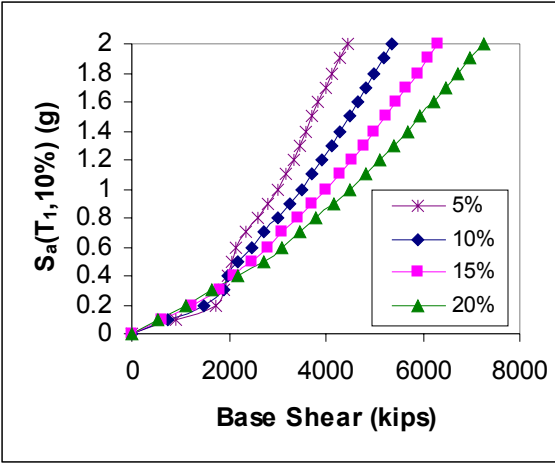


(a)



(b)

Figure B.11 (a-b): IDA Curves for 5-20% Critical Damping NF13

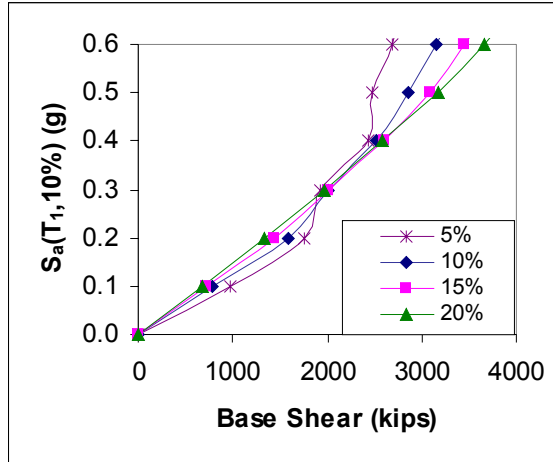


(a)

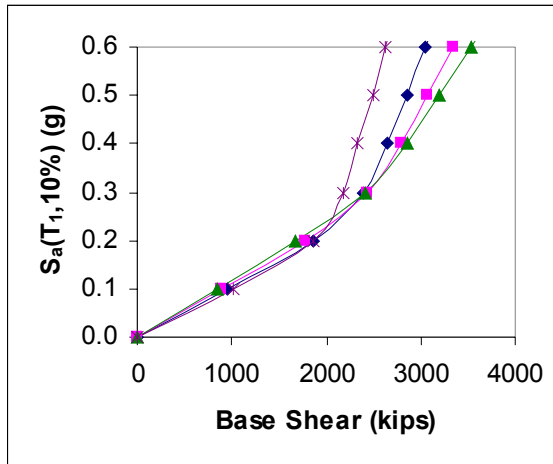
(b)

Figure B.12 (a-b): IDA Curves for 5-20% Critical Damping NF19

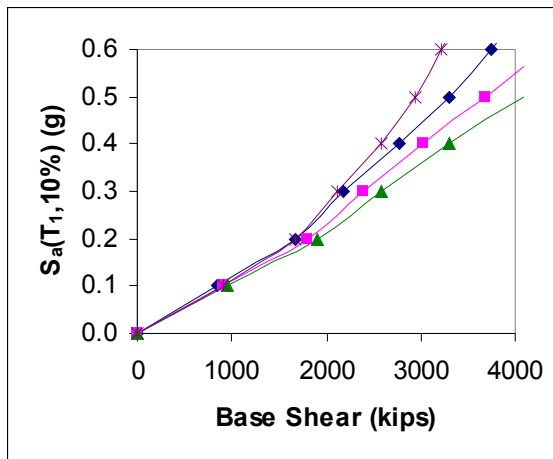
**B.2 Close ups of Peak Base Shear IDA Curves for 5-20% Critically Damped Structure with Linear Dampers**



**Figure B.13: Close-Up of Base Shear IDA LA01**



**Figure B.14: Close-Up of Base Shear IDA LA07**



**Figure B.15: Close-Up of Base Shear IDA LA10**

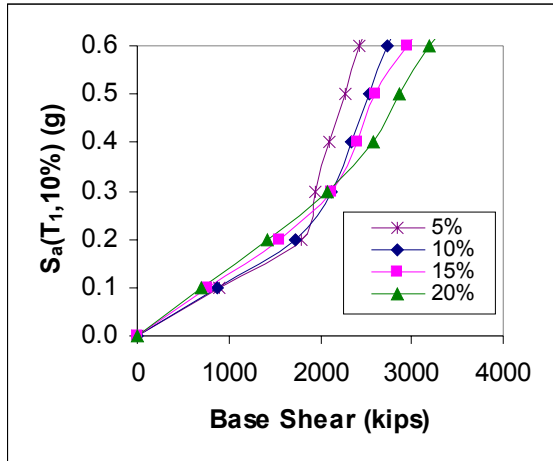


Figure B.16: Close-Up of Base Shear IDA LA11

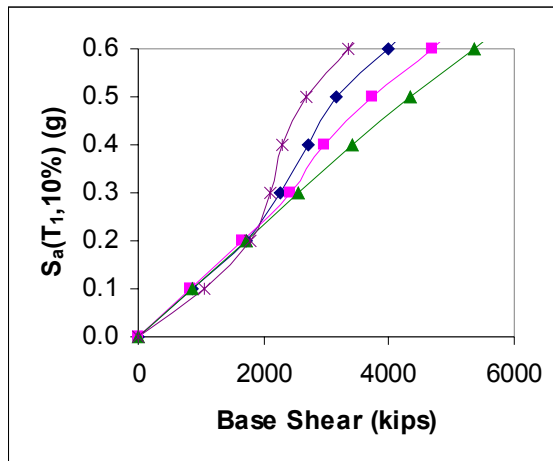


Figure B.17: Close-Up of Base Shear IDA LA13

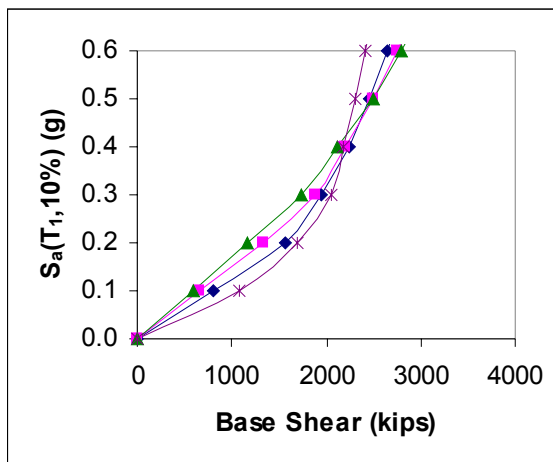


Figure B.18: Close-Up of Base Shear IDA LA17

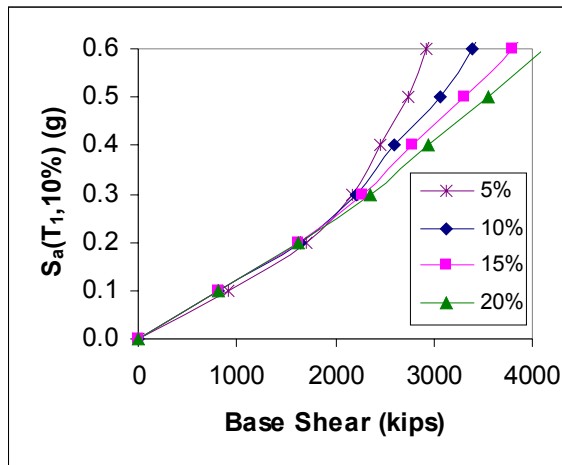


Figure B.19: Close-Up of Base Shear IDA NF01

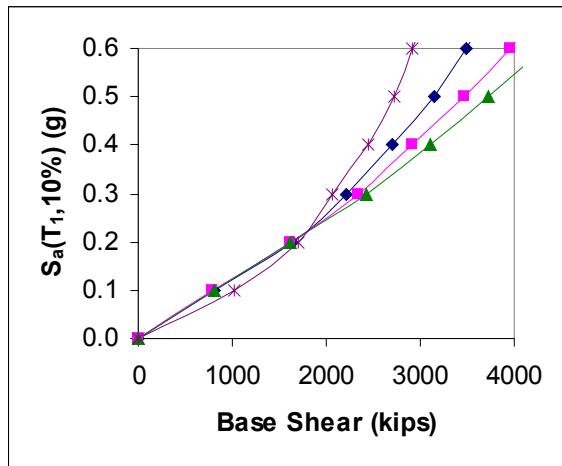


Figure B.20: Close-Up of Base Shear IDA NF07

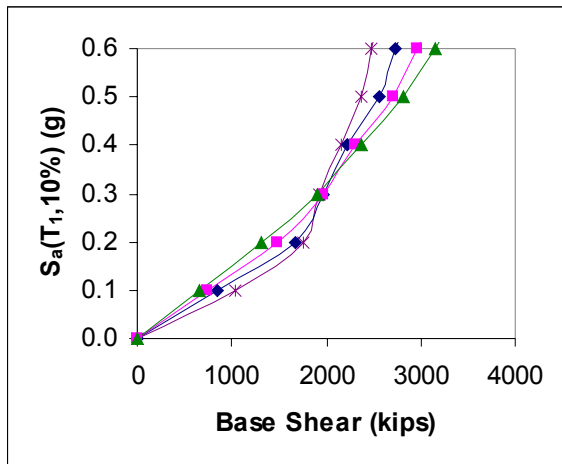


Figure B.21: Close-Up of Base Shear IDA NF09

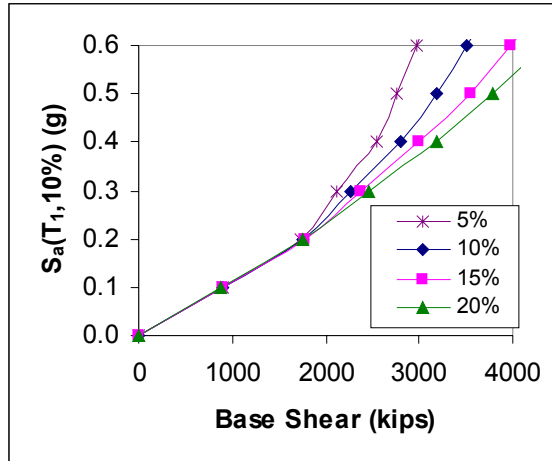


Figure B.22: Close-Up of Base Shear IDA NF11

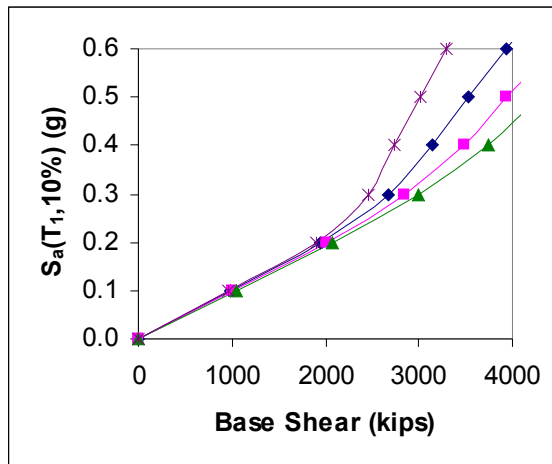


Figure B.23: Close-Up of Base Shear IDA NF13

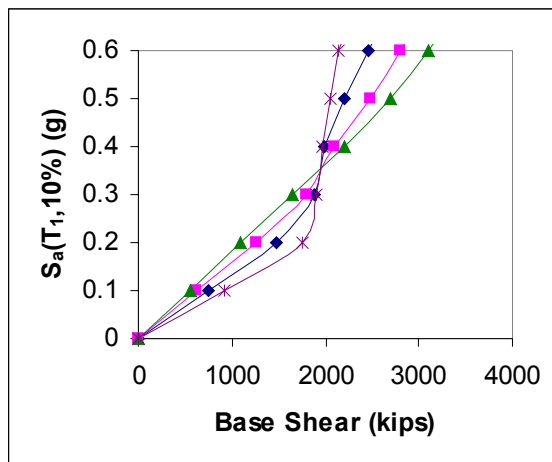
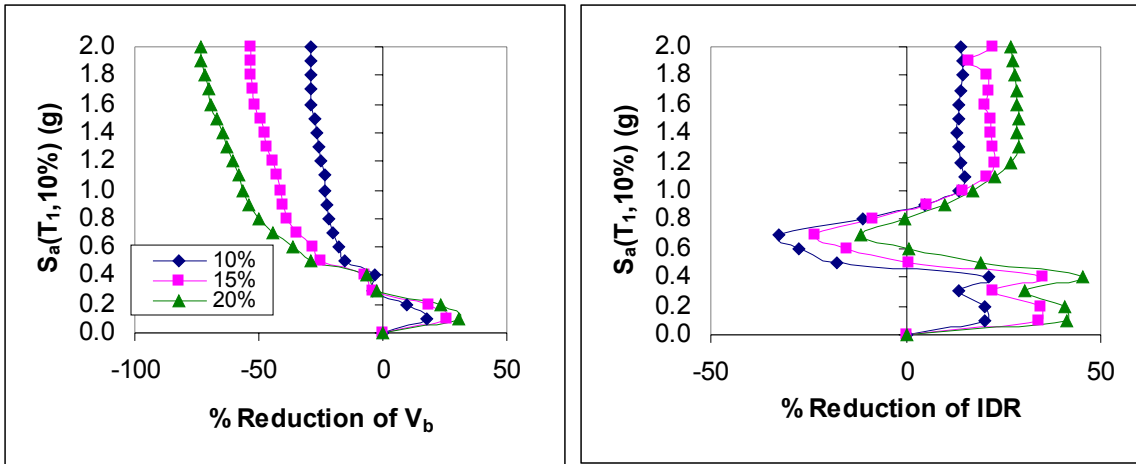


Figure B.24: Close-Up of Base Shear IDA NF19

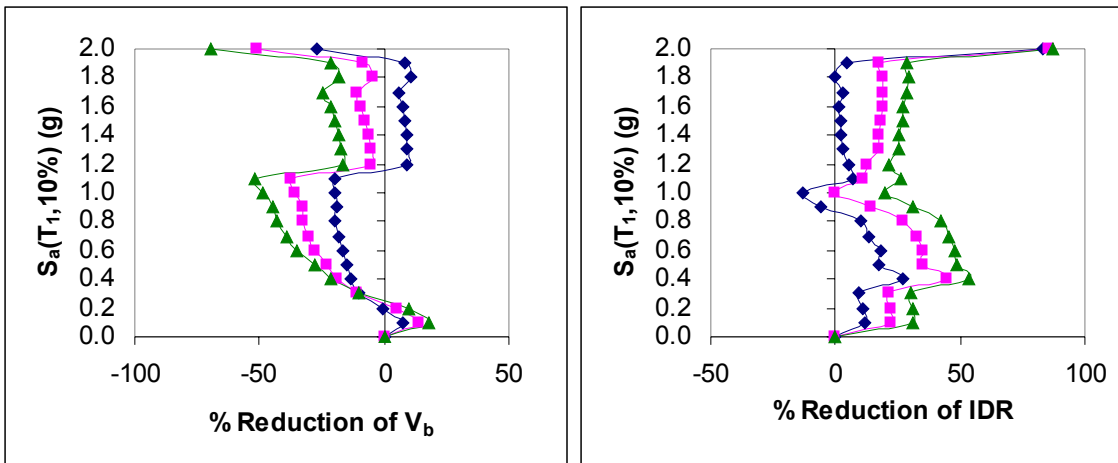
**B.3 Percent Reduction of Peak Base Shear and Drift IDA Curves for 5-20% Critically Damped Structure with Linear Dampers**



(a)

(b)

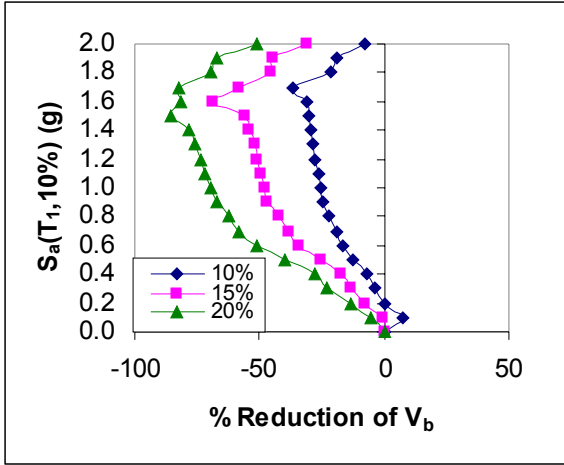
**Figure B.25 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping LA01**



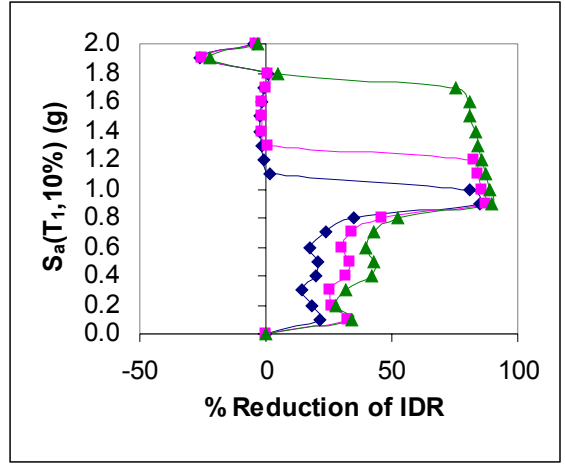
(a)

(b)

**Figure B.26 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping LA07**

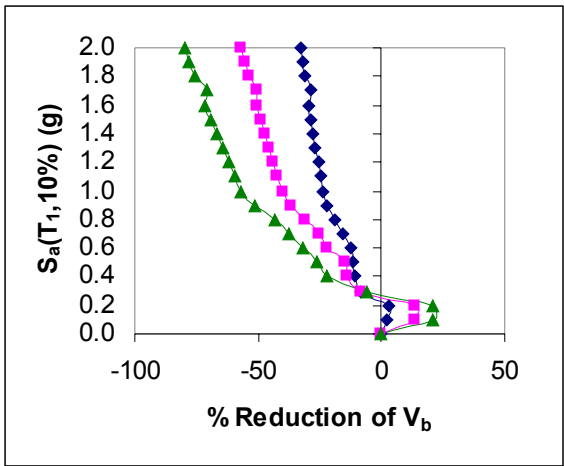


(a)

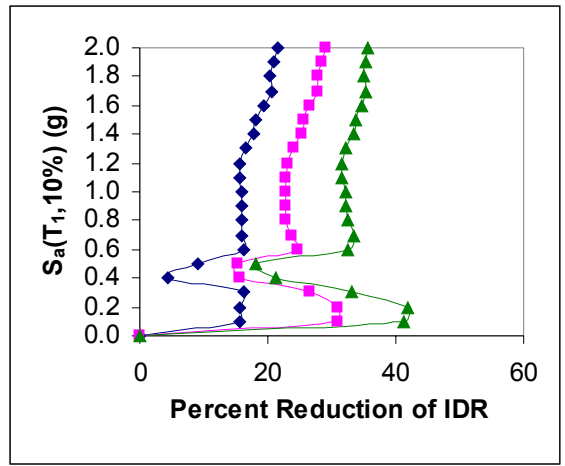


(b)

Figure B.27 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping LA10

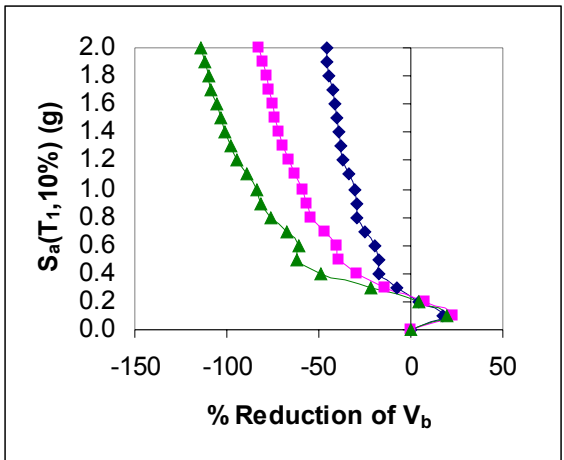


(a)

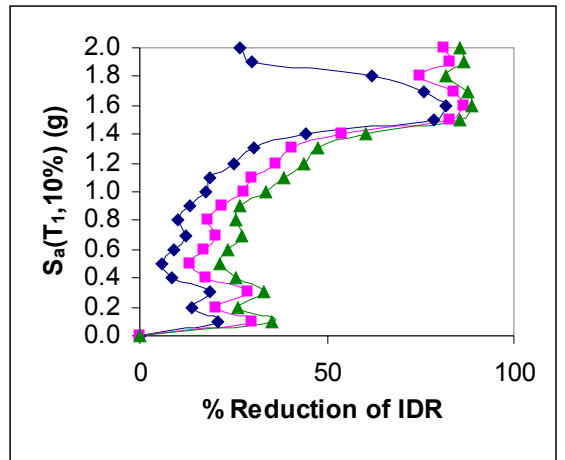


(b)

Figure B.28 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping LA11

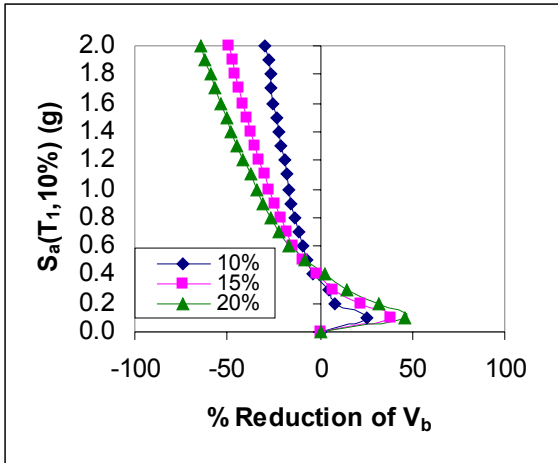


(a)

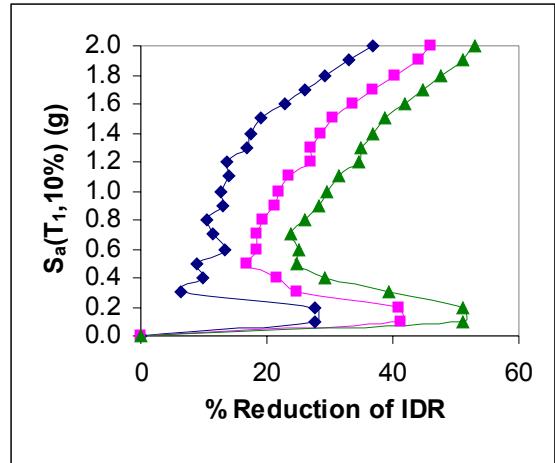


(b)

Figure B.29 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping LA13

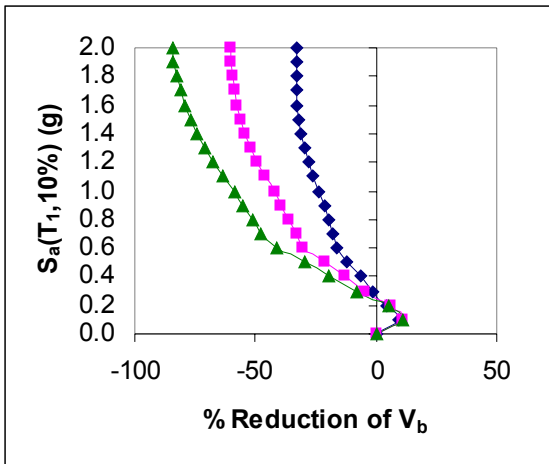


(a)

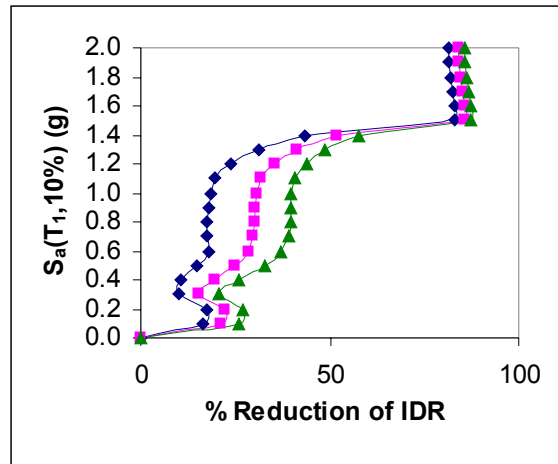


(b)

Figure B.30 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping LA17

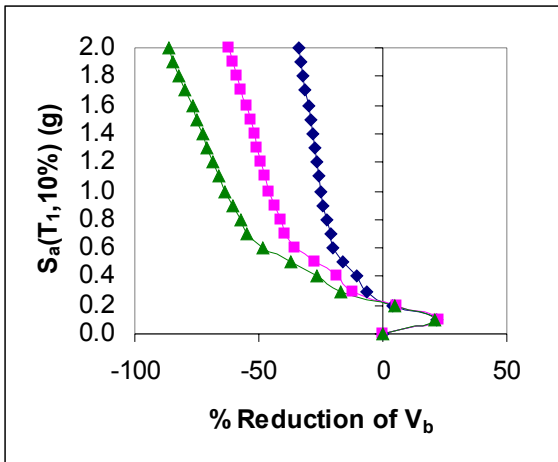


(a)

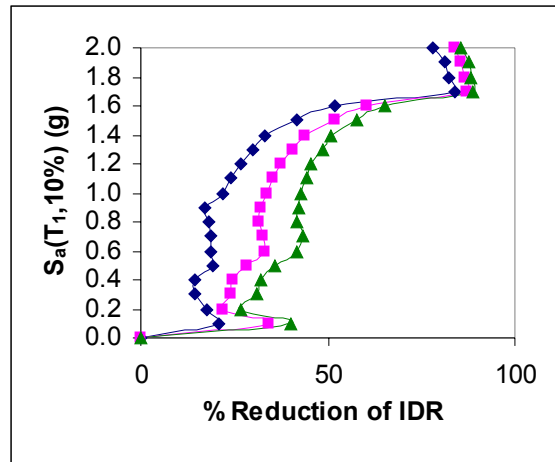


(b)

Figure B.31 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping NF01

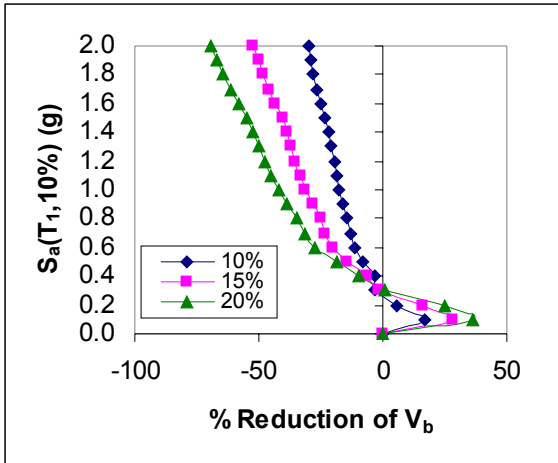


(a)

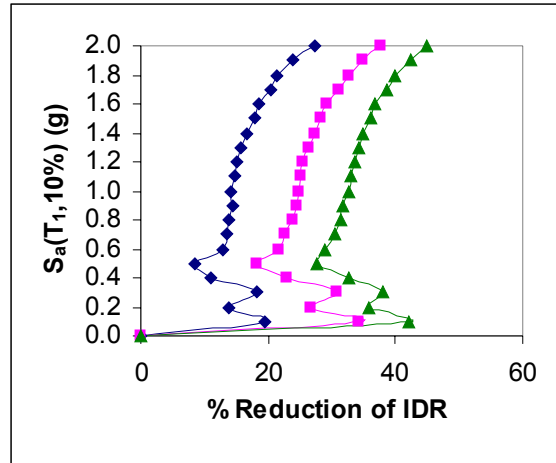


(b)

Figure B.32 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping NF07

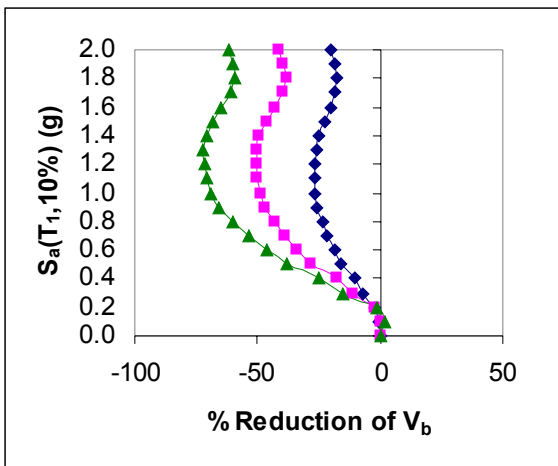


(a)

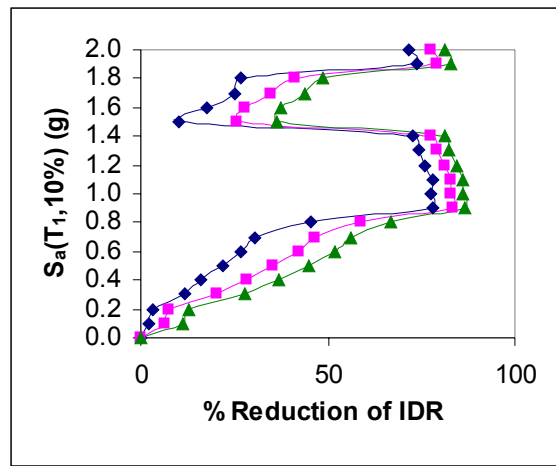


(b)

Figure B.33 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping NF09

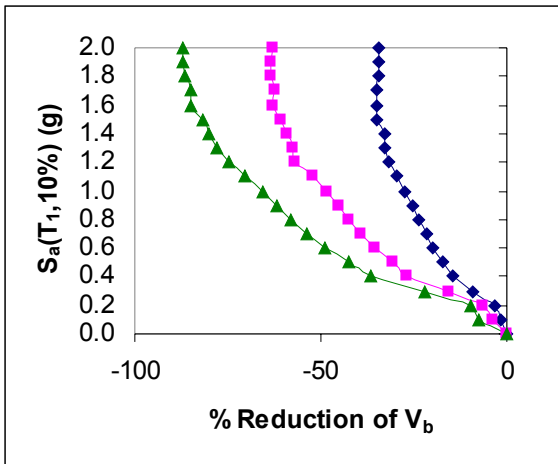


(a)

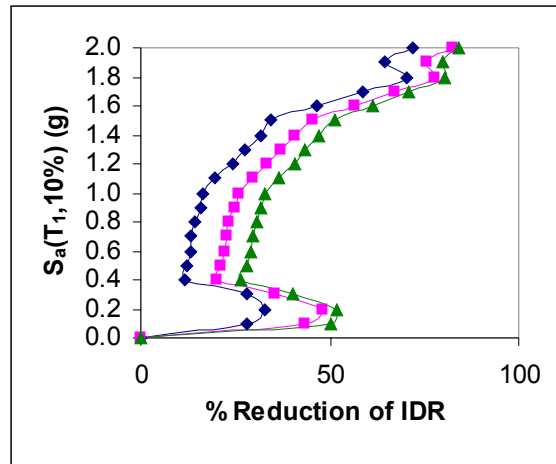


(b)

Figure B.34 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping NF11

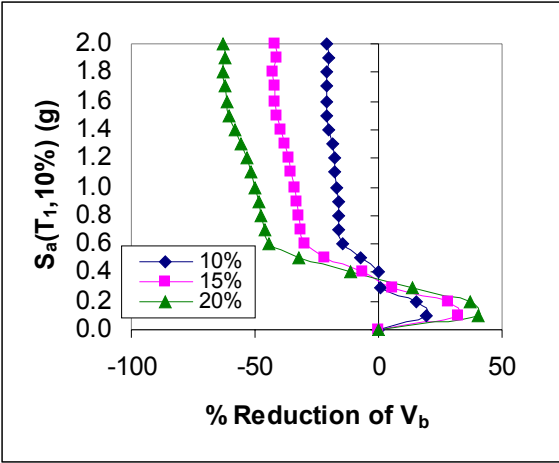


(a)

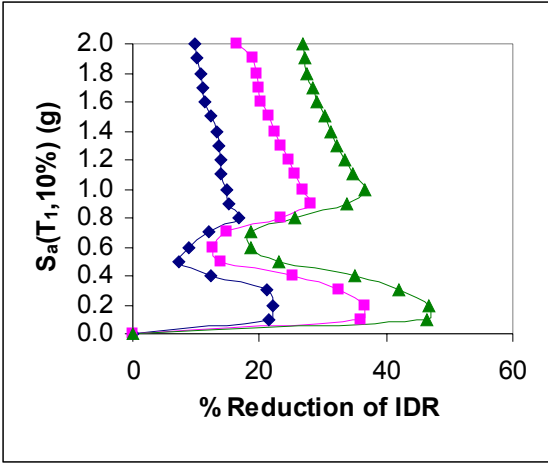


(b)

Figure B.35 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping NF13



(a)



(b)

Figure B.36 (a-b): Percent Reduction IDA Curves for 5-20% Critical Damping NF19

## B.4 Peak Base Shear and Drift Multi-Record IDA Curves for 10% Critically Damped Structure with Various Types of Dampers

### B.4.1 Multi-Record IDA for LA Ground Motions

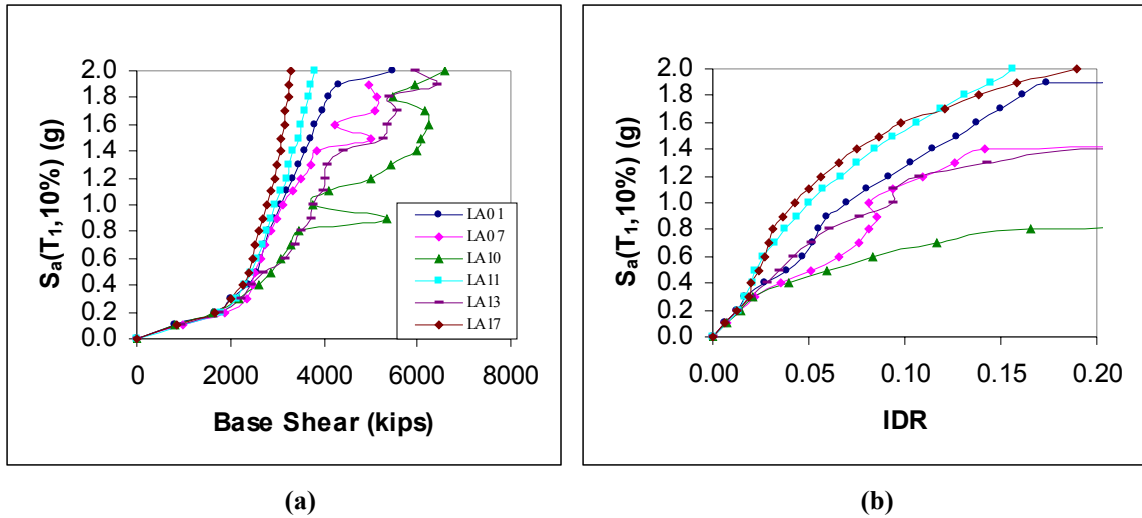


Figure B.37 (a-b): LA Ground Motion IDA Curves for 10% Critical Damping  $\alpha=0.5$  at 1% Drift

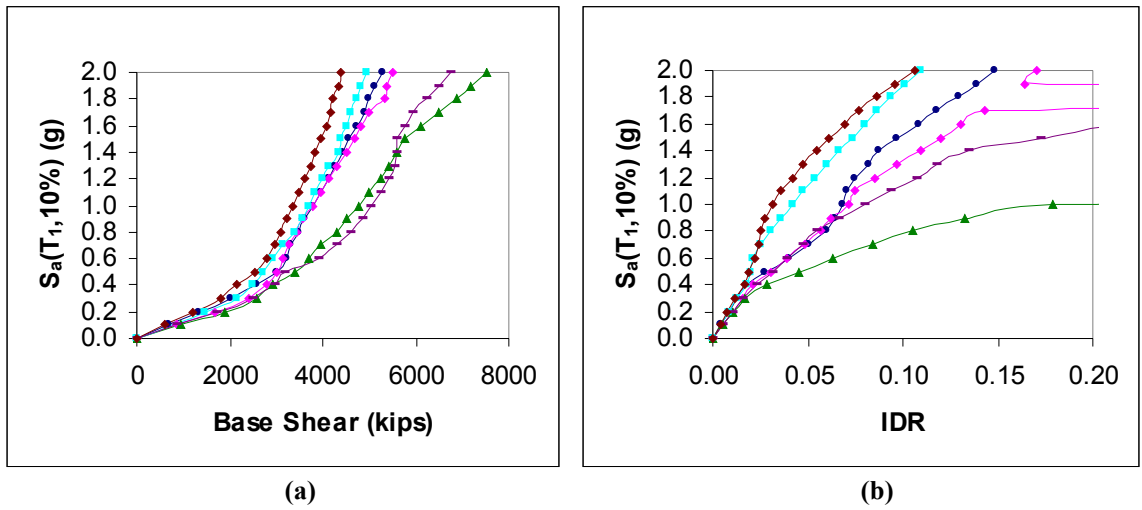
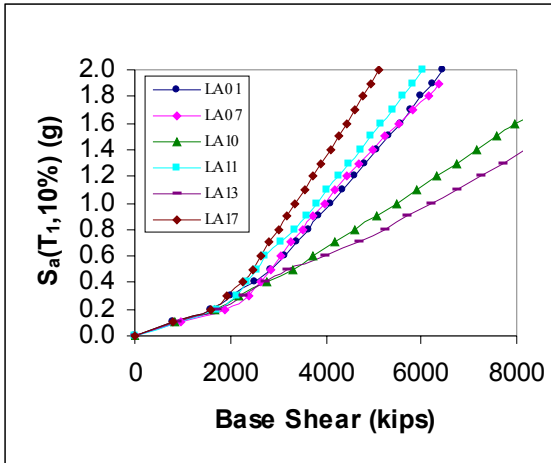
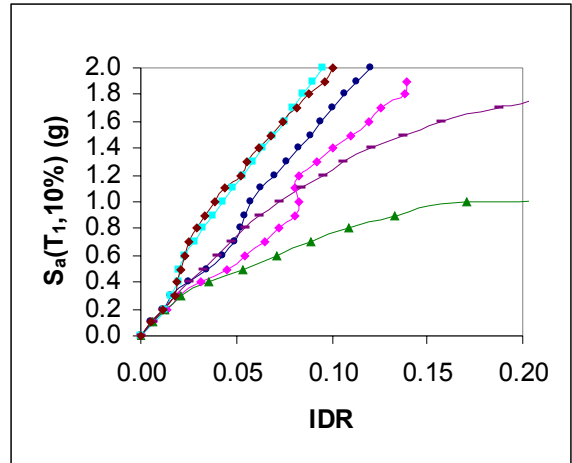


Figure B.38 (a-b): LA Ground Motion IDA Curves for 10% Critical Damping  $\alpha=0.5$  at 5% Drift

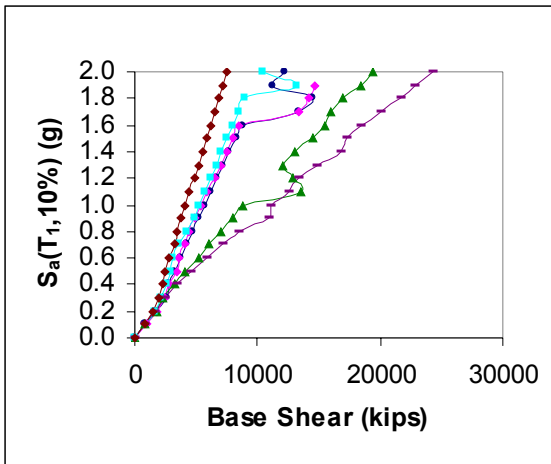


(a)

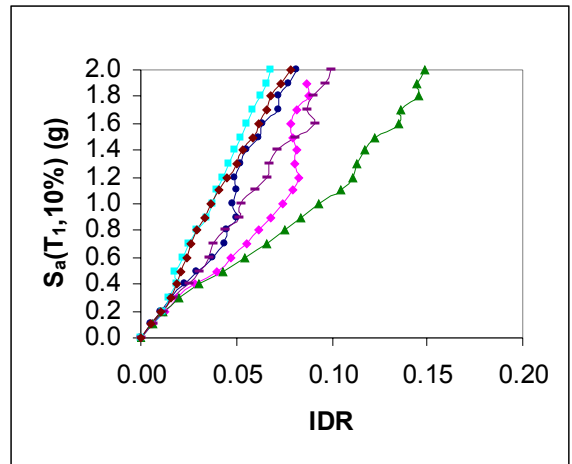


(b)

Figure B.39 (a-b): LA Ground Motion IDA Curves for 10% Critical Damping  $\alpha=1.0$

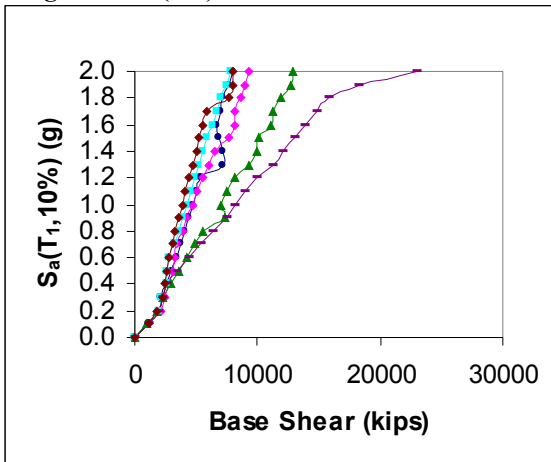


(a)

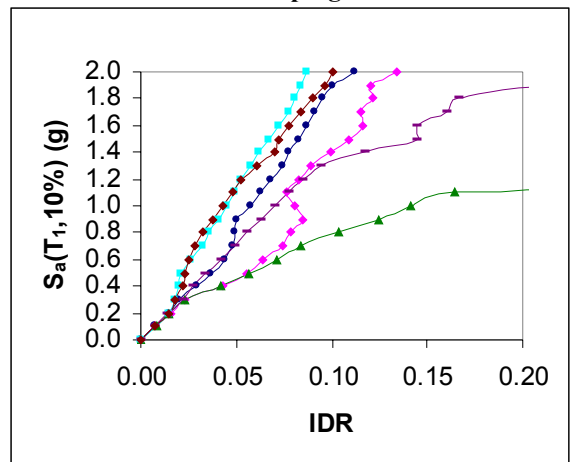


(b)

Figure B.40 (a-b): LA Ground Motion IDA Curves for 10% Critical Damping  $\alpha=1.5$  at 1% Drift



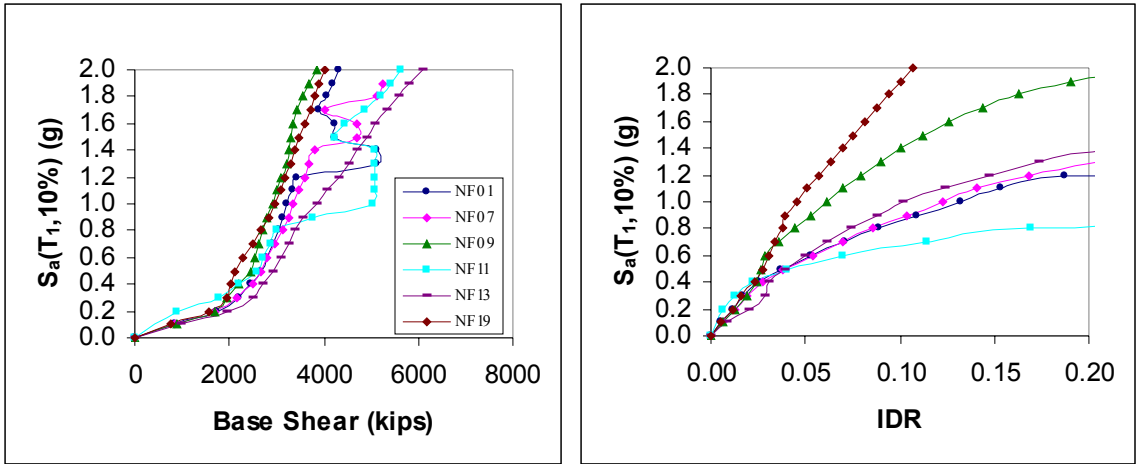
(a)



(b)

Figure B.41 (a-b): LA Ground Motion IDA Curves for 10% Critical Damping  $\alpha=1.5$  at 5% Drift

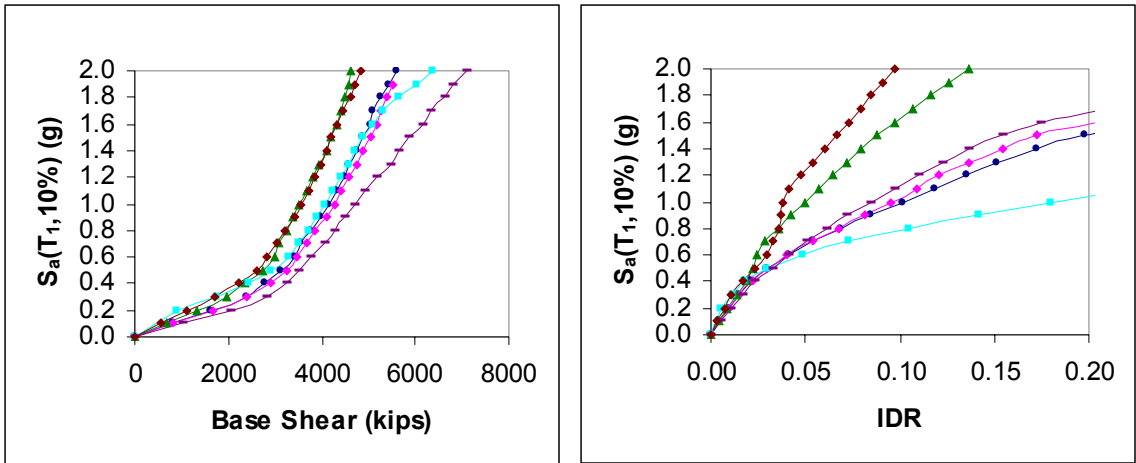
### B.4.2 Multi-Record IDA for NF Ground Motions



(a)

(b)

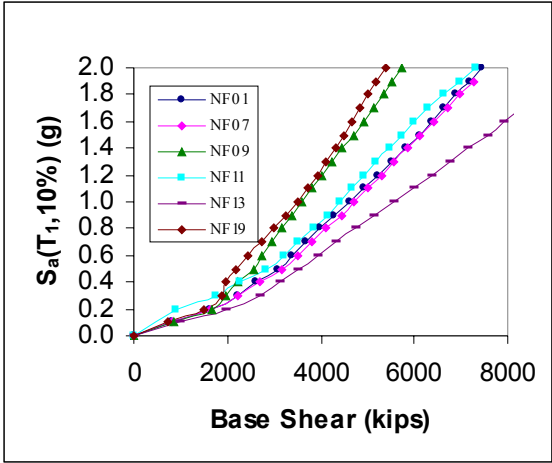
Figure B.42 (a-b): NF Ground Motion IDA Curves for 10% Critical Damping  $\alpha=0.5$  at 1% Drift



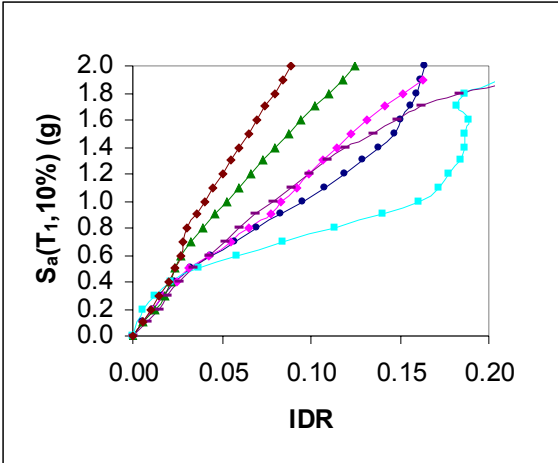
(a)

(b)

Figure B.43 (a-b): NF Ground Motion IDA Curves for 10% Critical Damping  $\alpha=0.5$  at 5% Drift

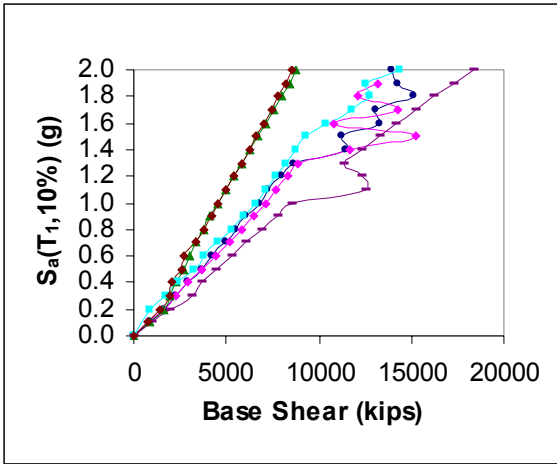


(a)

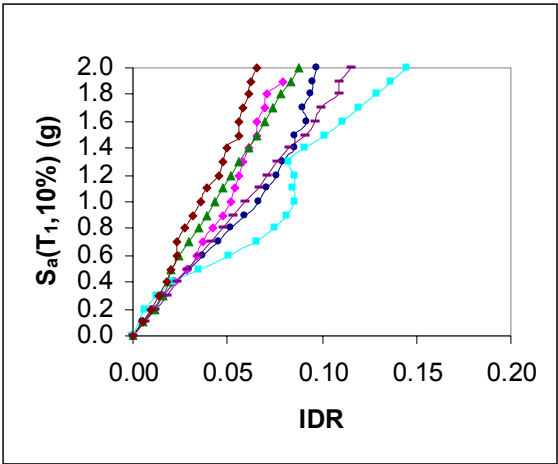


(b)

Figure B.44 (a-b): NF Ground Motion IDA Curves for 10% Critical Damping  $\alpha=1.0$

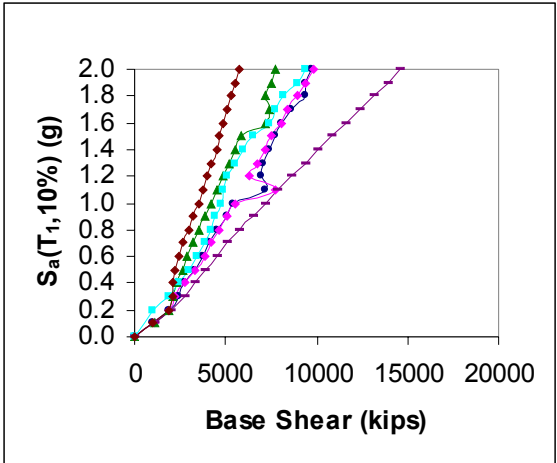


(a)

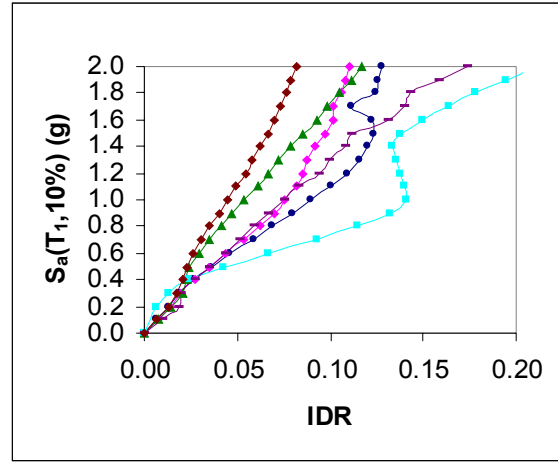


(b)

Figure B.45 (a-b): NF Ground Motion IDA Curves for 10% Critical Damping  $\alpha=1.5$  at 1% Drift



(a)

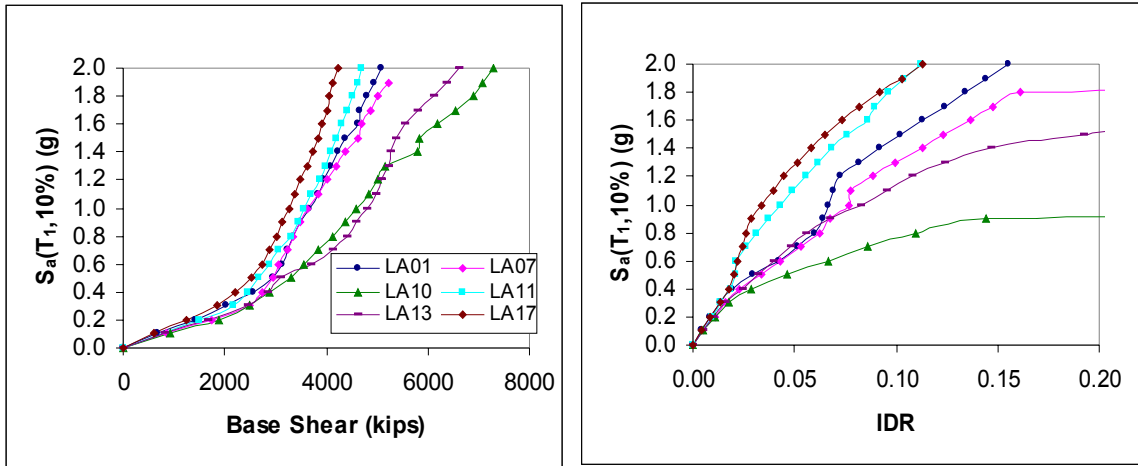


(b)

Figure B.46 (a-b): NF Ground Motion IDA Curves for 10% Critical Damping  $\alpha=1.5$  at 5% Drift

## B.5 Peak Base Shear and Drift Multi-Record IDA Curves for 20% Critically Damped Structure with Various Types of Dampers

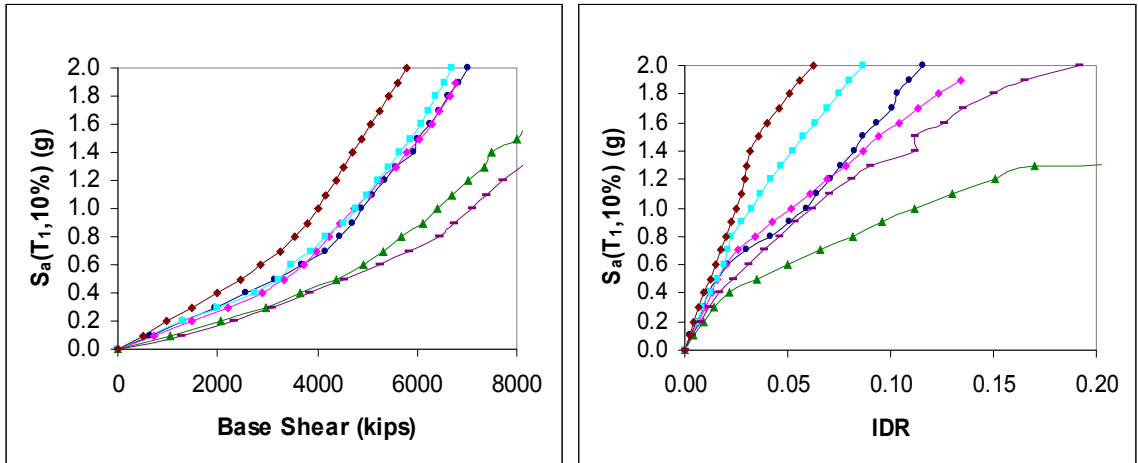
### B.5.1 Multi-Record IDA for LA Ground Motions



(a)

(b)

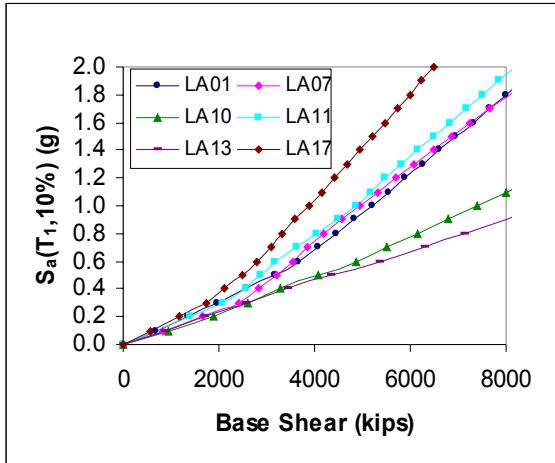
Figure B.47 (a-b): LA Ground Motion IDA Curves for 20% Critical Damping  $\alpha=0.5$  at 1% Drift



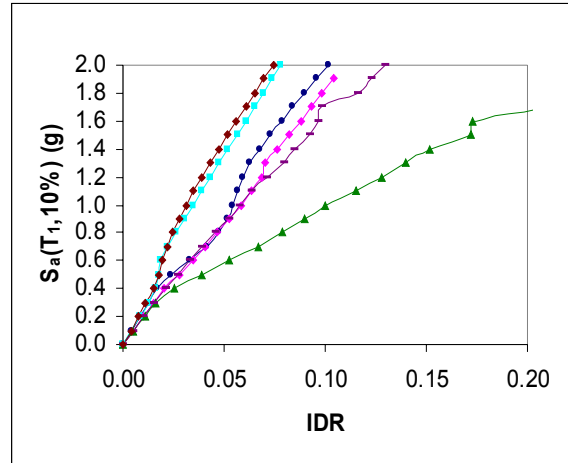
(a)

(b)

Figure B.48 (a-b): LA Ground Motion IDA Curves for 20% Critical Damping  $\alpha=0.5$  at 5% Drift

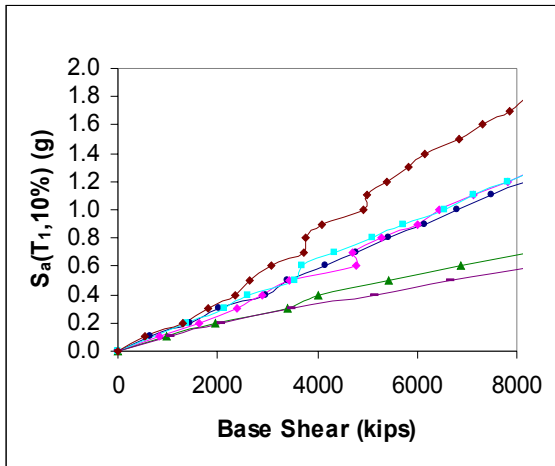


(a)

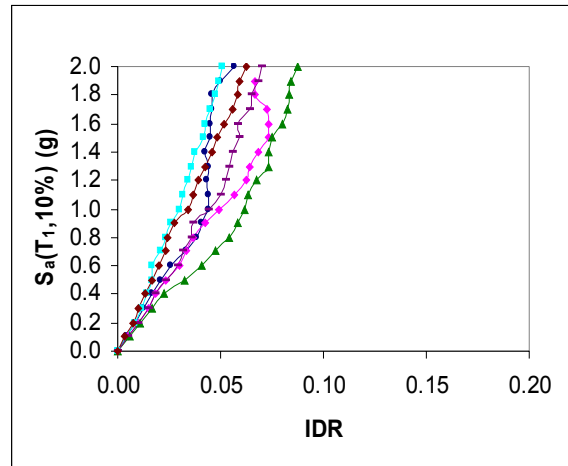


(b)

Figure B.49 (a-b): LA Ground Motion IDA Curves for 20% Critical Damping  $\alpha=1.0$

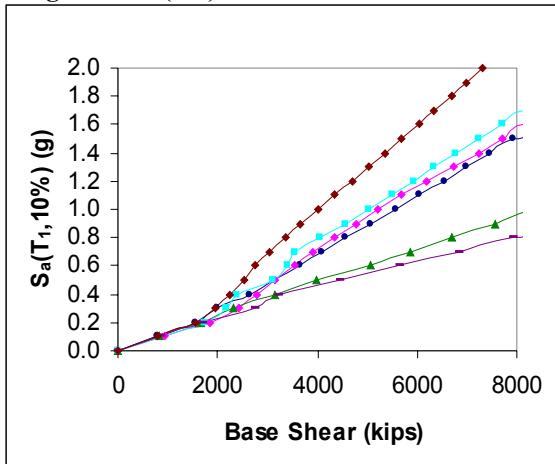


(a)

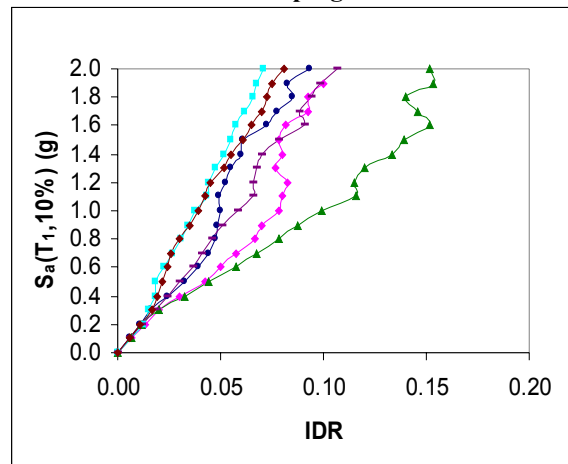


(b)

Figure B.50 (a-b): LA Ground Motion IDA Curves for 20% Critical Damping  $\alpha=1.5$  at 1% Drift



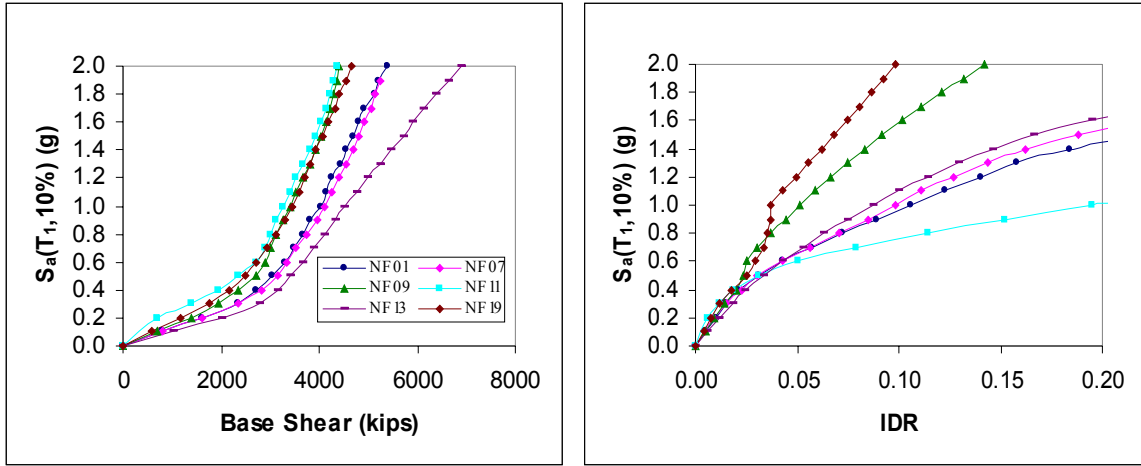
(a)



(b)

Figure B.51 (a-b): LA Ground Motion IDA Curves for 20% Critical Damping  $\alpha=1.5$  at 5% Drift

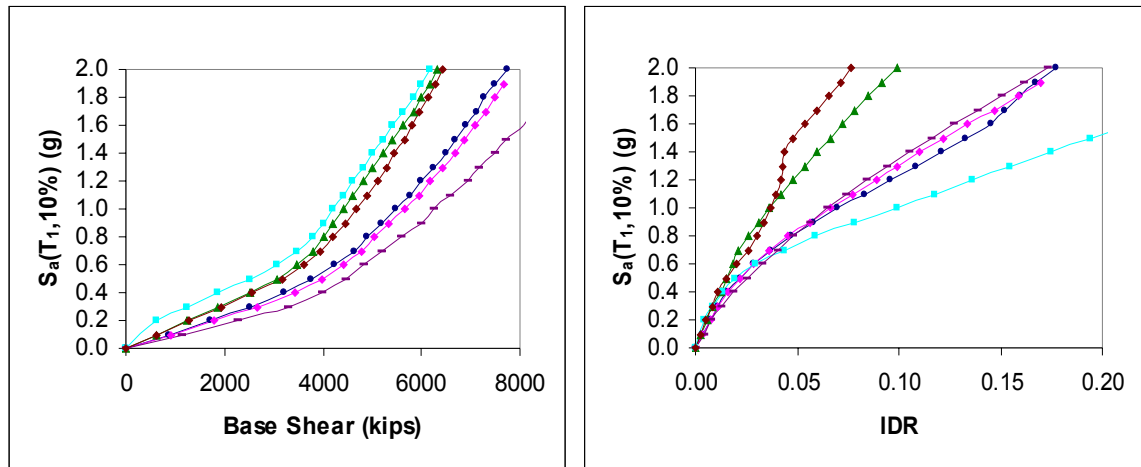
### B.5.2 Multi-Record IDA for NF Ground Motions



(a)

(b)

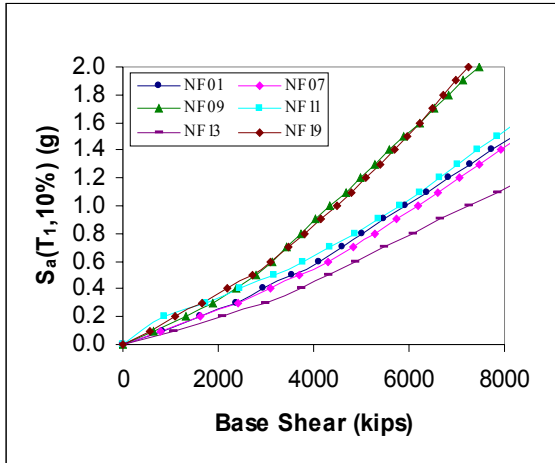
Figure B.52 (a-b): NF Ground Motion IDA Curves for 20% Critical Damping  $\alpha=0.5$  at 1% Drift



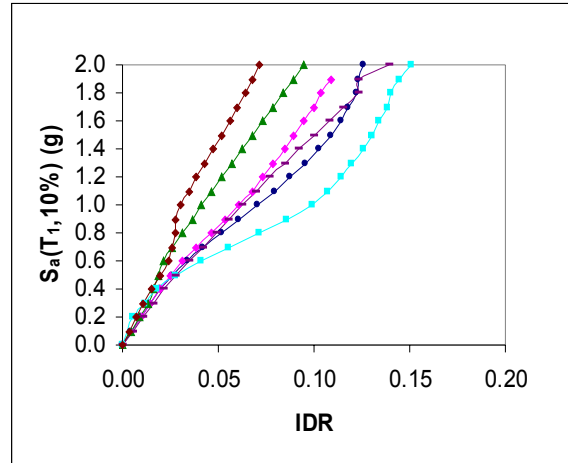
(a)

(b)

Figure B.53 (a-b): NF Ground Motion IDA Curves for 20% Critical Damping  $\alpha=0.5$  at 5% Drift

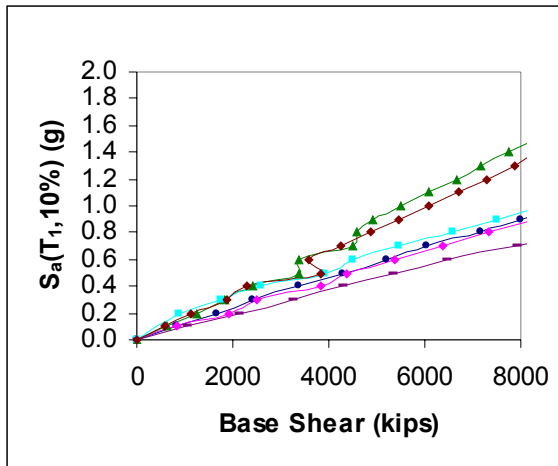


(a)

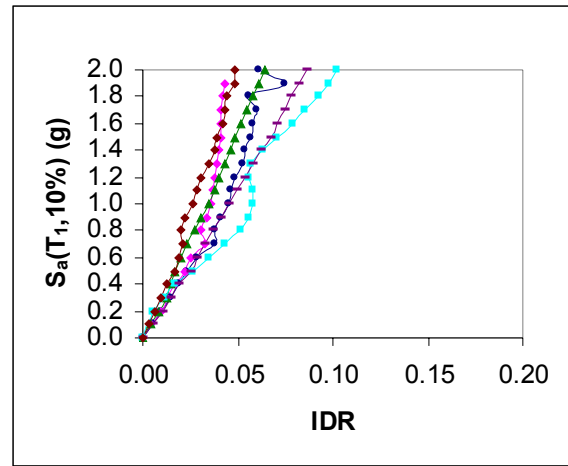


(b)

Figure B.54 (a-b): NF Ground Motion IDA Curves for 20% Critical Damping  $\alpha=1.0$

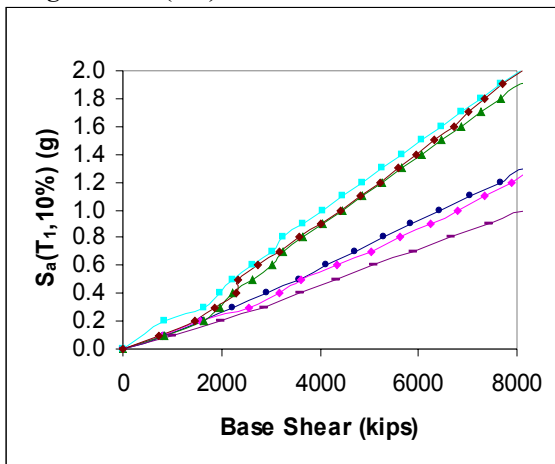


(a)

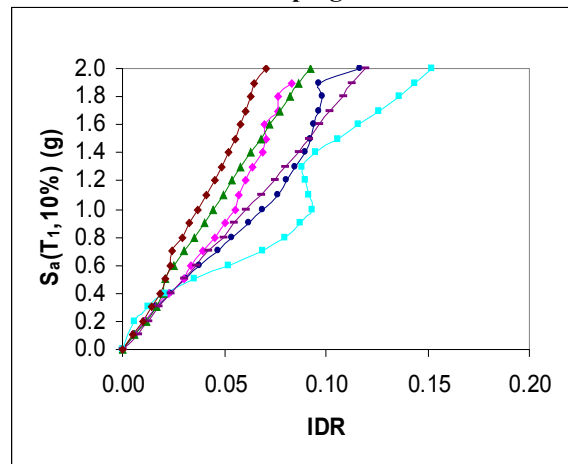


(b)

Figure B.55 (a-b): NF Ground Motion IDA Curves for 20% Critical Damping  $\alpha=1.5$  at 1% Drift



(a)

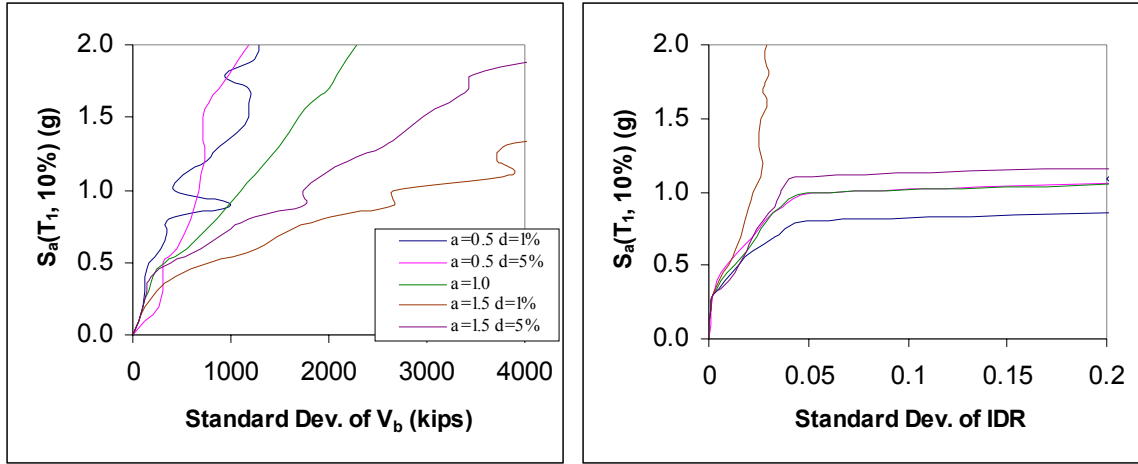


(b)

Figure B.56 (a-b): NF Ground Motion IDA Curves for 20% Critical Damping  $\alpha=1.5$  at 5% Drift

## B.6 Multi-Record Standard Deviation IDA Curves

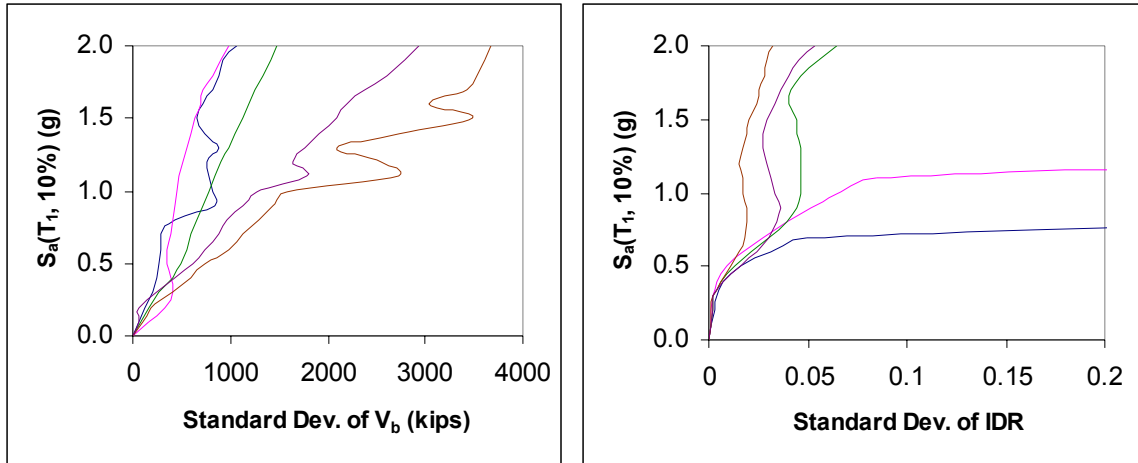
### B.6.1 Standard Deviation IDA Curves for 10% Critical Damping



(a)

(b)

Figure B.57 (a-b): Standard Deviation IDA Curves 10% Critically Damped for LA Ground Motions

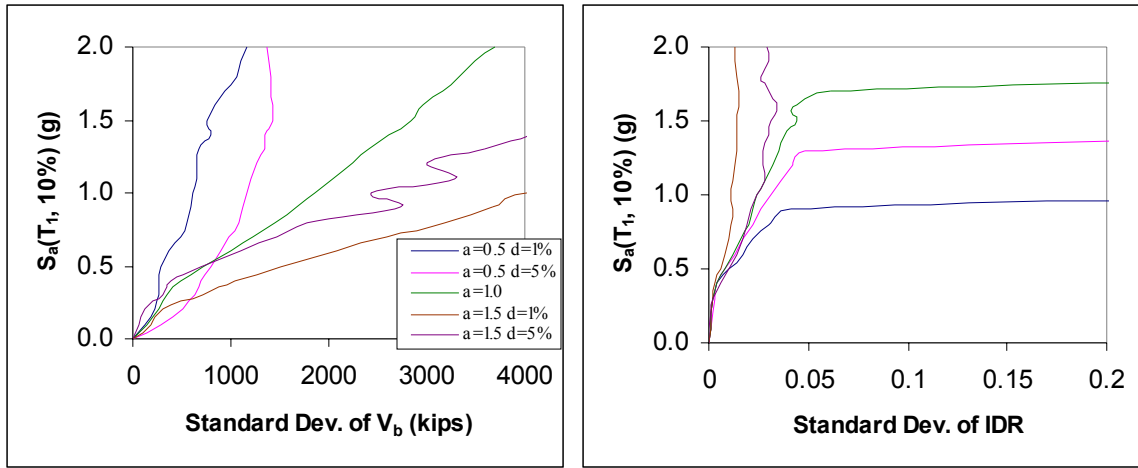


(a)

(b)

Figure B.58 (a-b): Standard Deviation IDA Curves 10% Critically Damped for NF Ground Motions

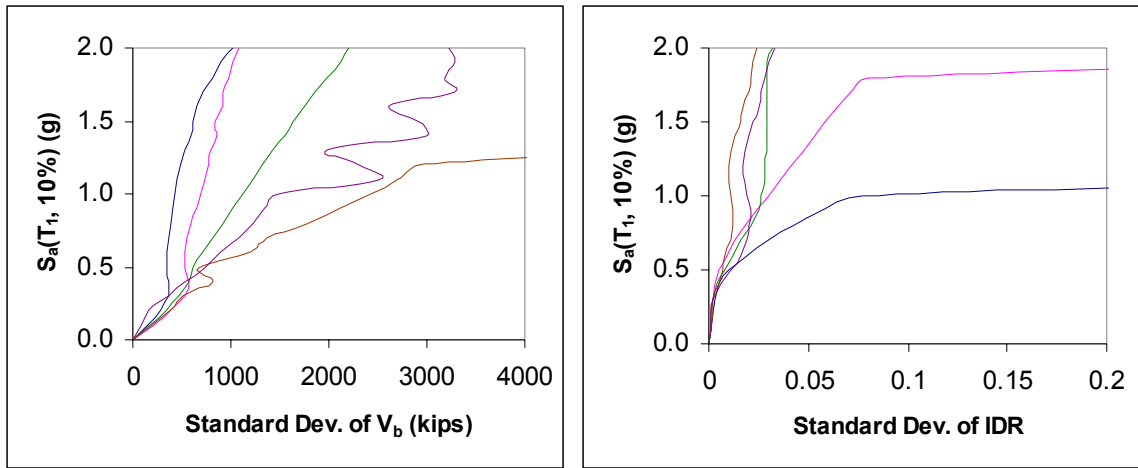
**B.6.2 Standard Deviation IDA Curves for 20% Critical Damping**



(c)

(b)

**Figure B.59 (a-b): Standard Deviation IDA Curves 20% Critically Damped for LA Ground Motions**



(d)

(b)

**Figure B.60 (a-b): Standard Deviation IDA Curves 20% Critically Damped for NF Ground Motions**

## B.7 Peak Base Shear and Drift IDA Curves for Structure with Various Types of Dampers

### B.7.1 IDA Curves for 10% Critical Damping

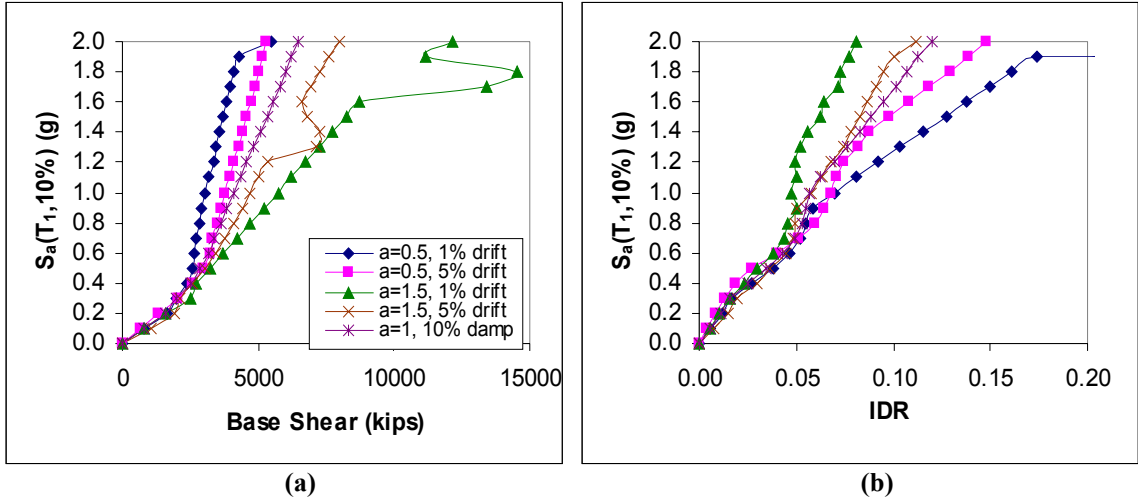


Figure B.61 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to LA01

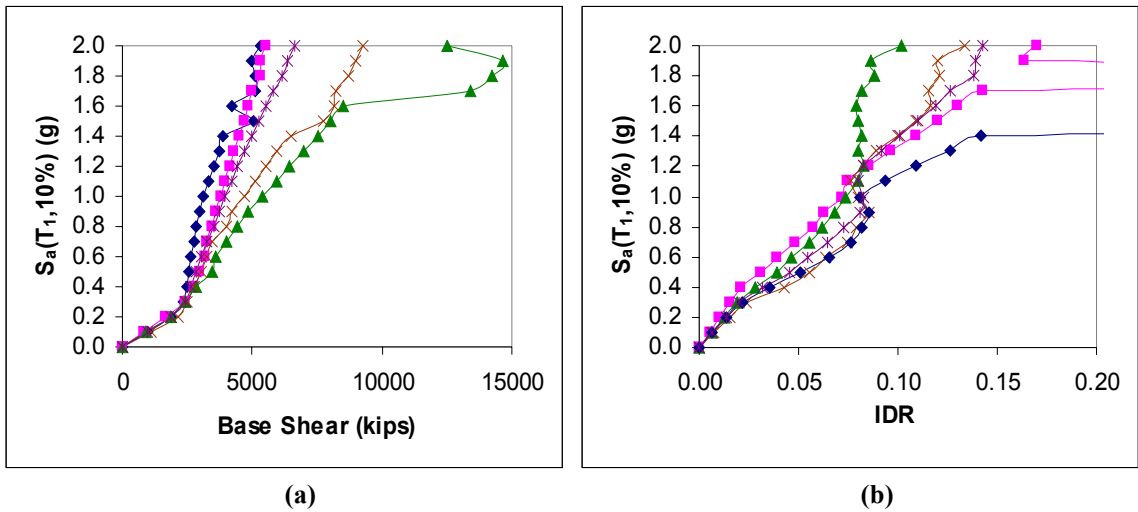
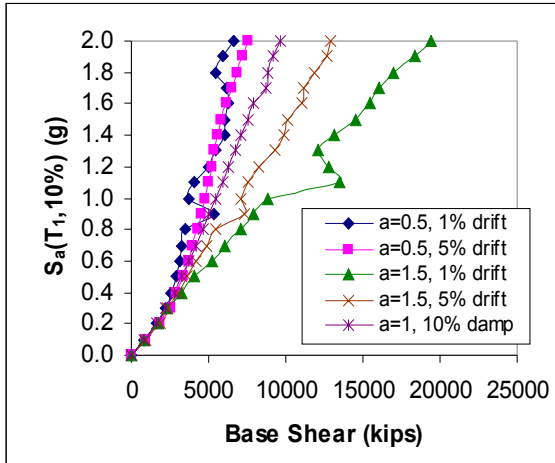
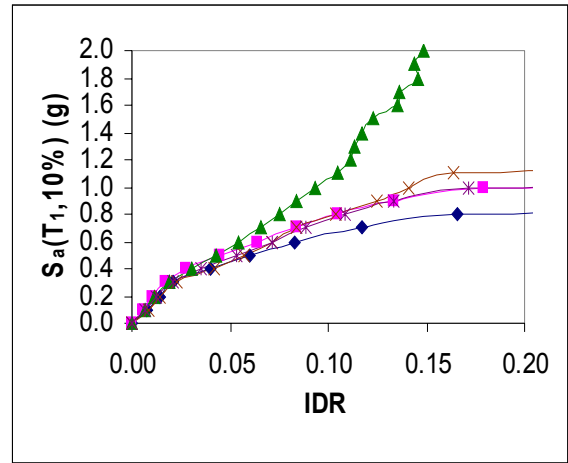


Figure B.62 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to LA07

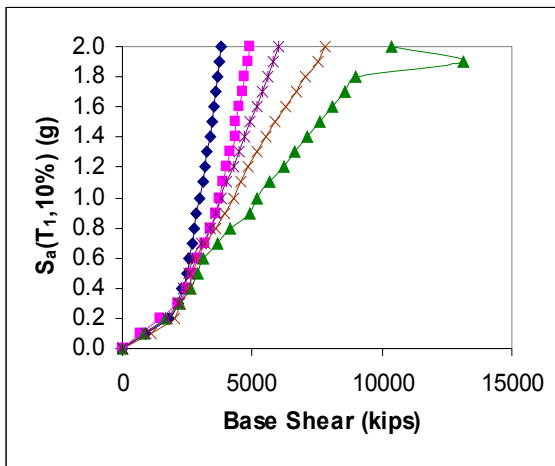


(a)

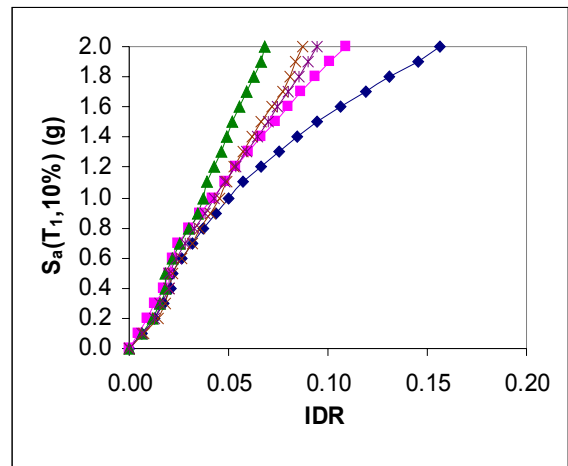


(b)

Figure B.63 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to LA10

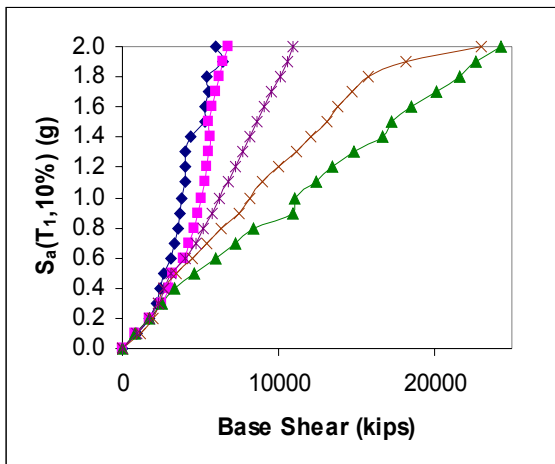


(a)

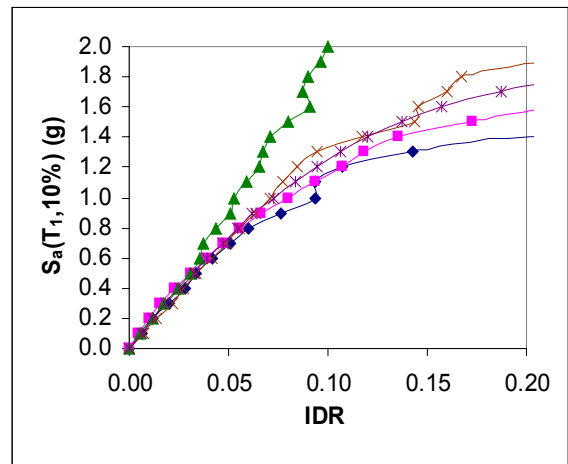


(b)

Figure B.64 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to LA11

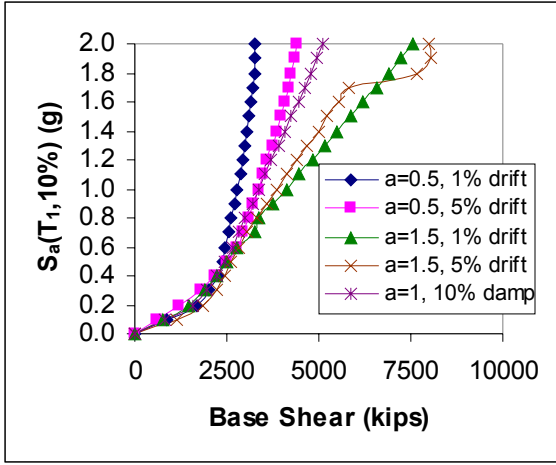


(a)

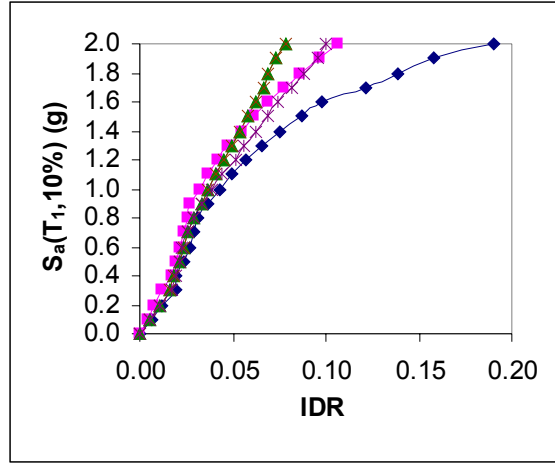


(b)

Figure B.65 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to LA13

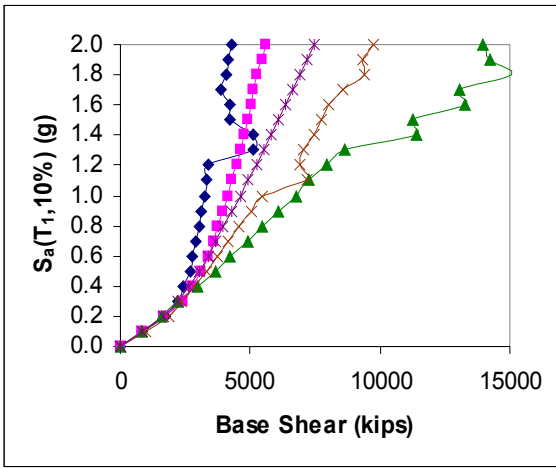


(a)

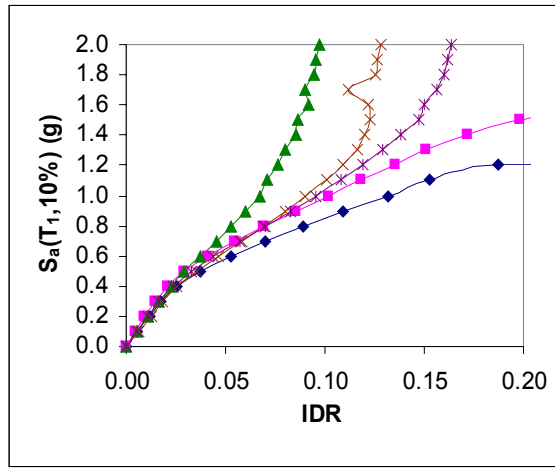


(b)

Figure B.66 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to LA17

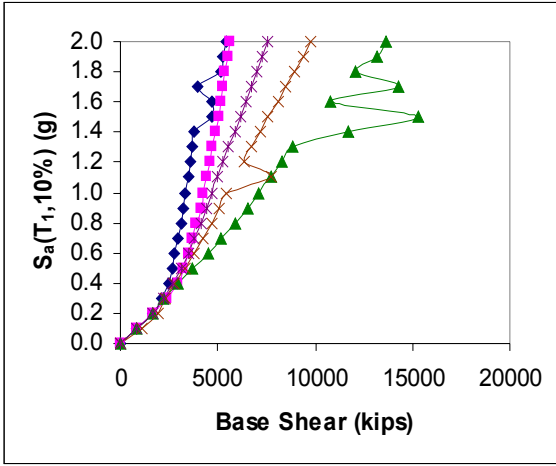


(a)

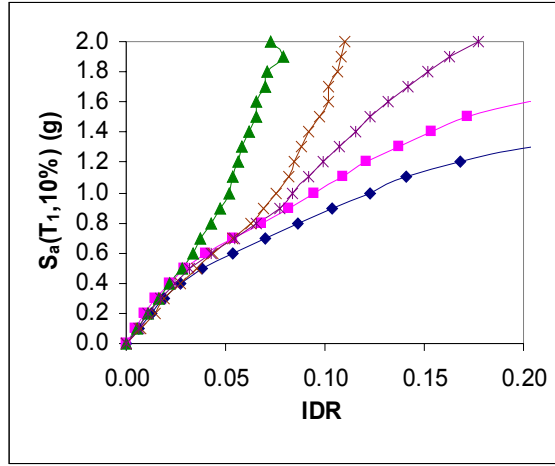


(b)

Figure B.67 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to NF17

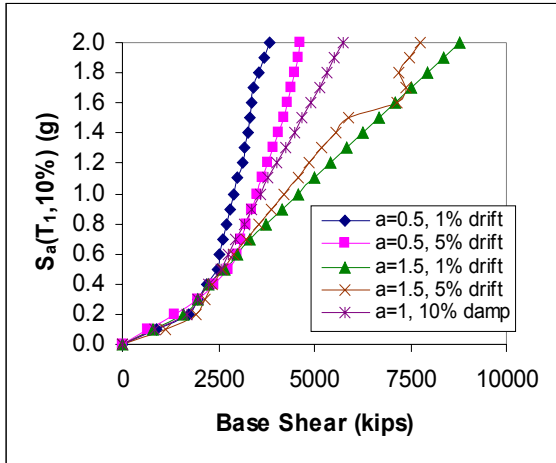


(a)

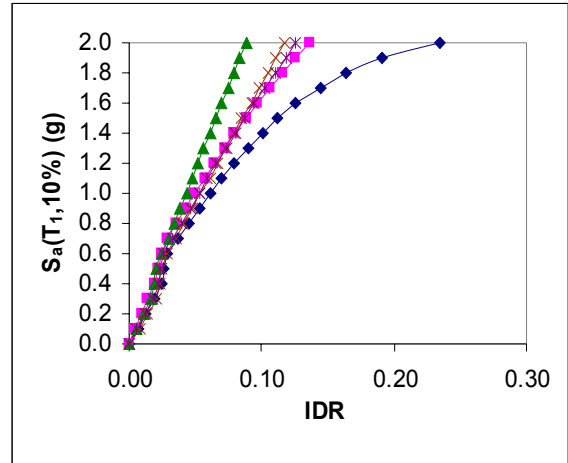


(b)

Figure B.68 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to NF07

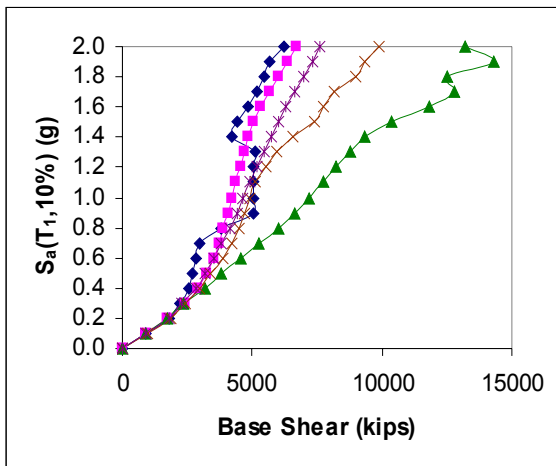


(a)

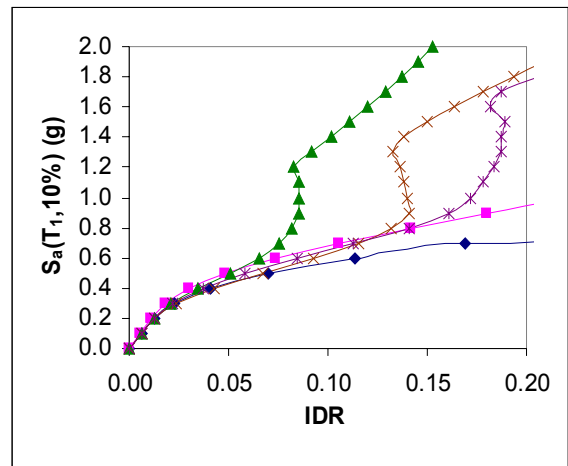


(b)

Figure B.69 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to NF09

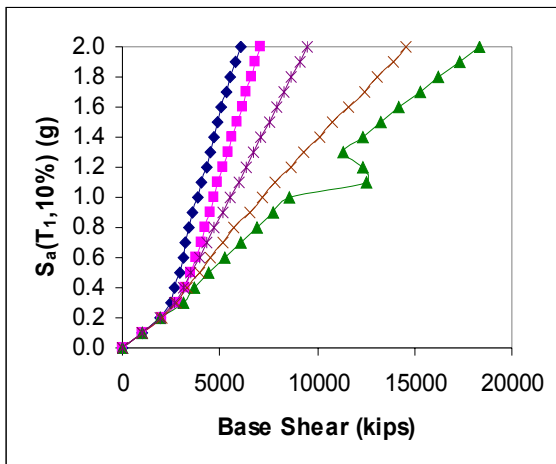


(a)

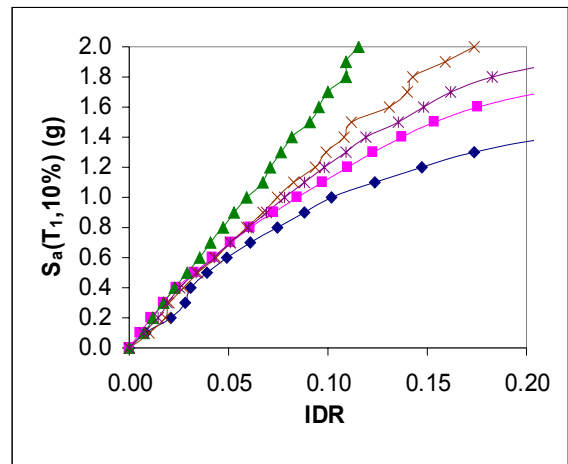


(b)

Figure B.70 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to NF11

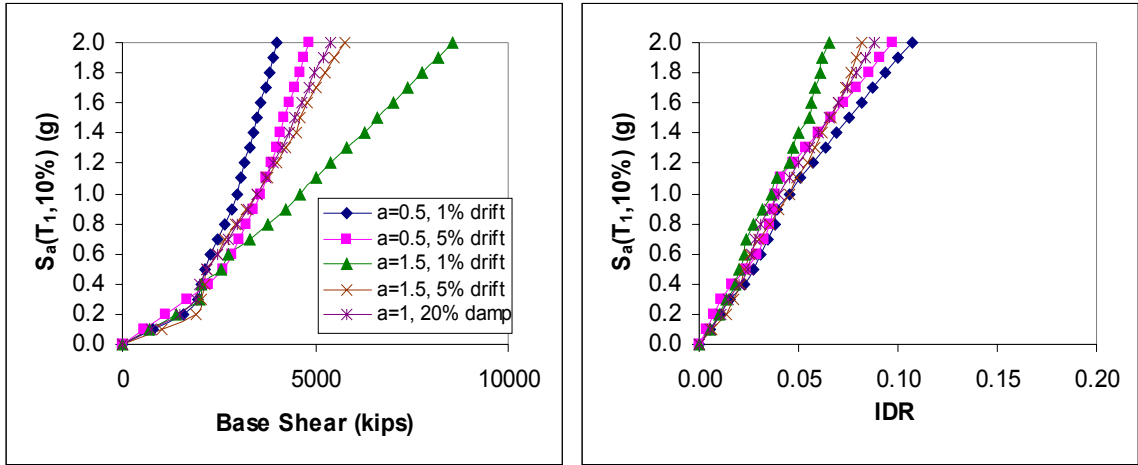


(a)



(b)

Figure B.71 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to NF13



(a)

(b)

Figure B.72 (a-b): IDA Curves for 10% Critically Damped Structure Subjected to NF19

### B.7.2 IDA Curves for 20% Critical Damping

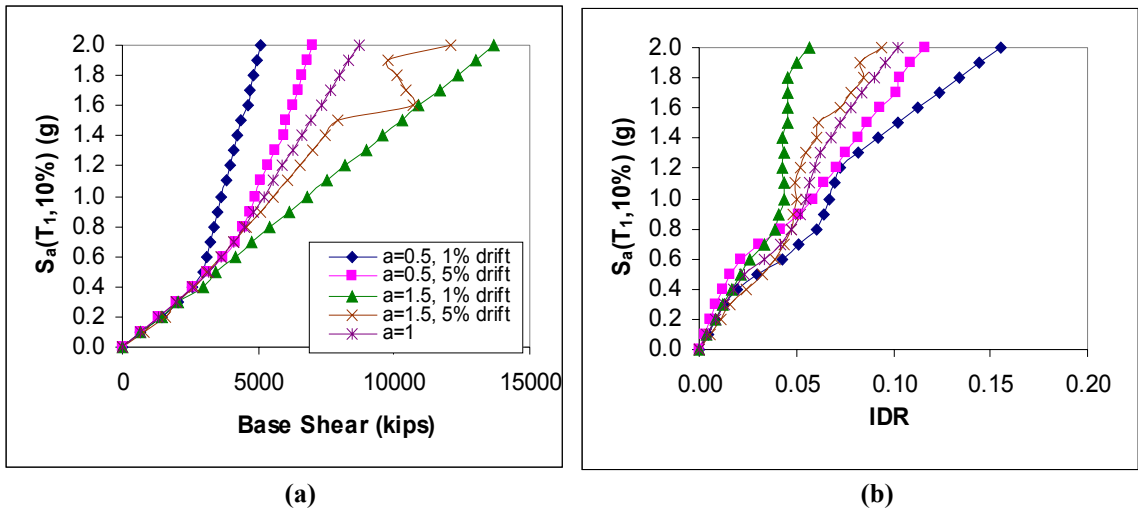


Figure B.73 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to LA01

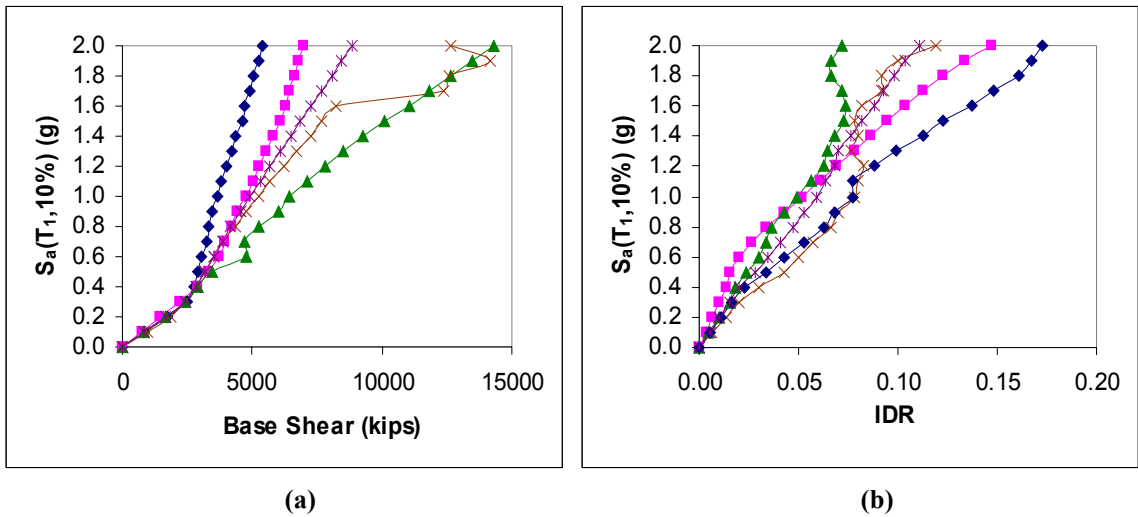
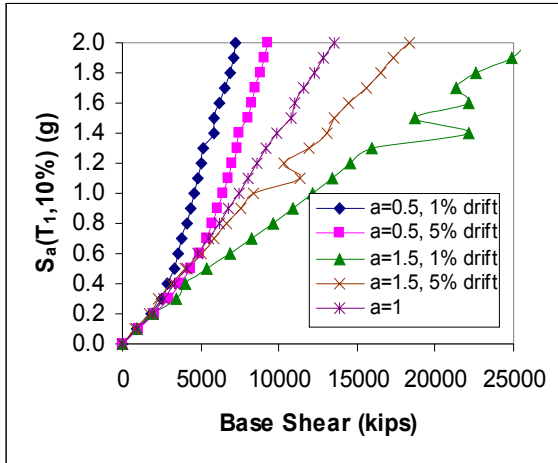
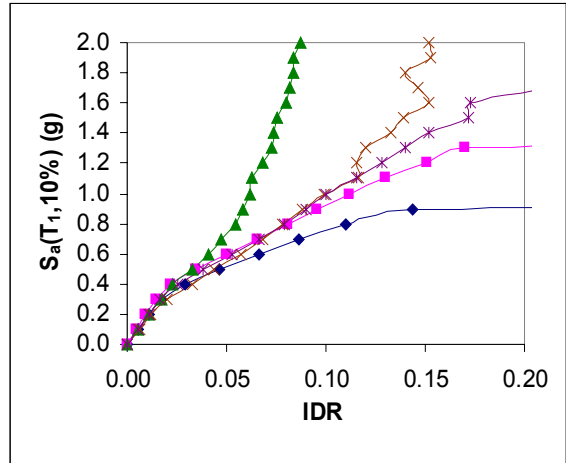


Figure B.74 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to LA07

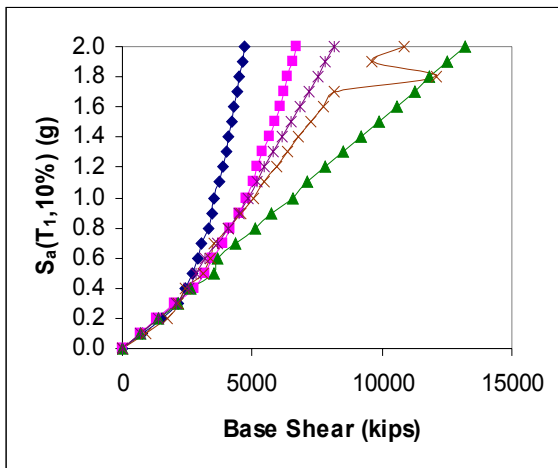


(a)

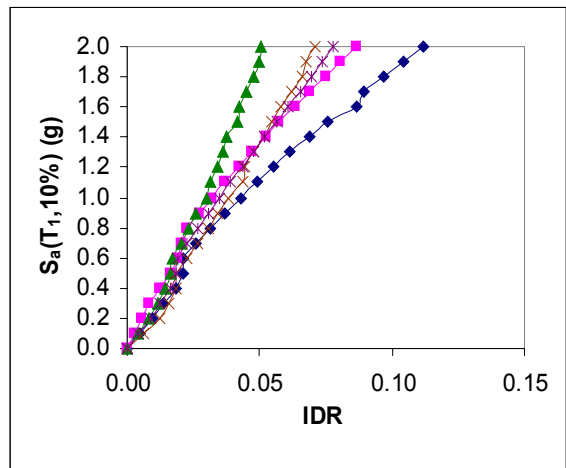


(b)

Figure B.75 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to LA10

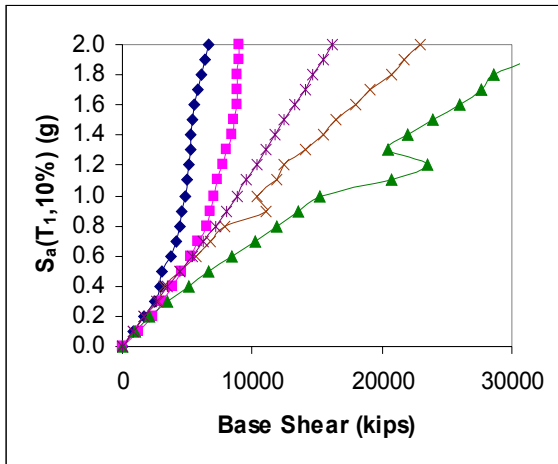


(a)

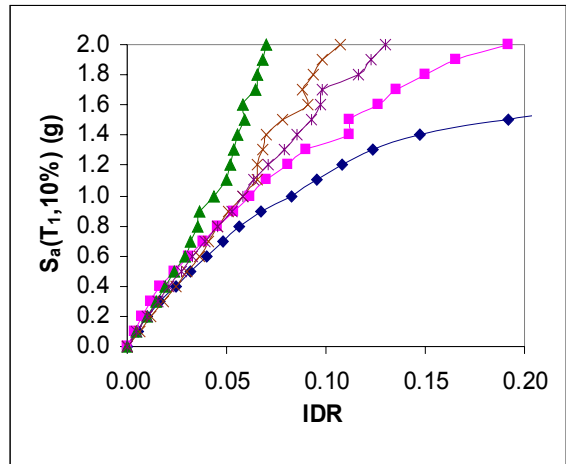


(b)

Figure B.76 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to LA11

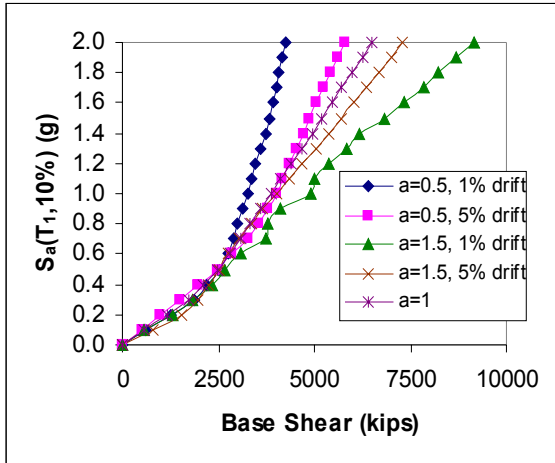


(a)

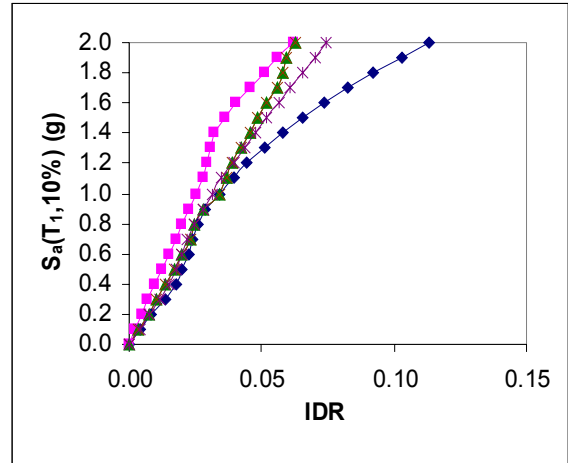


(b)

Figure B.77 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to LA13

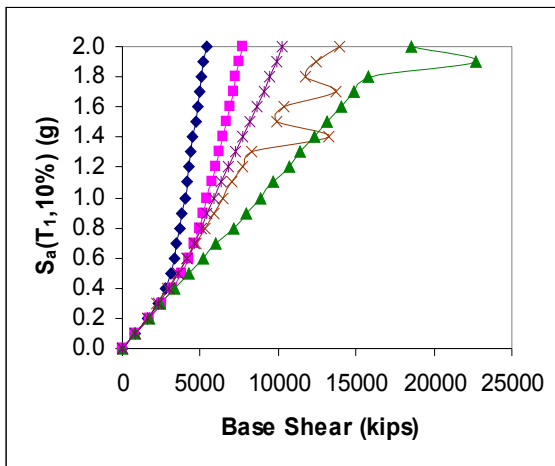


(a)

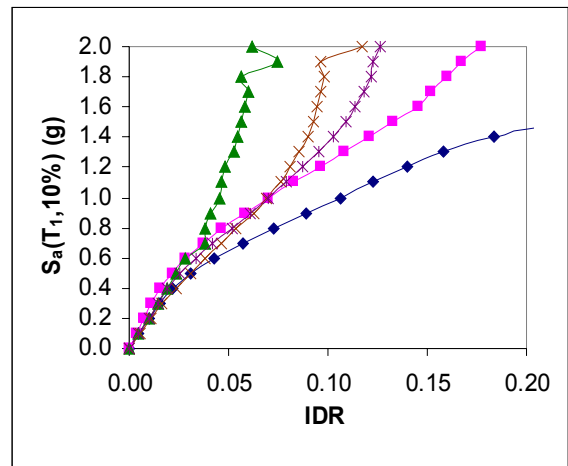


(b)

Figure B.78 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to LA17

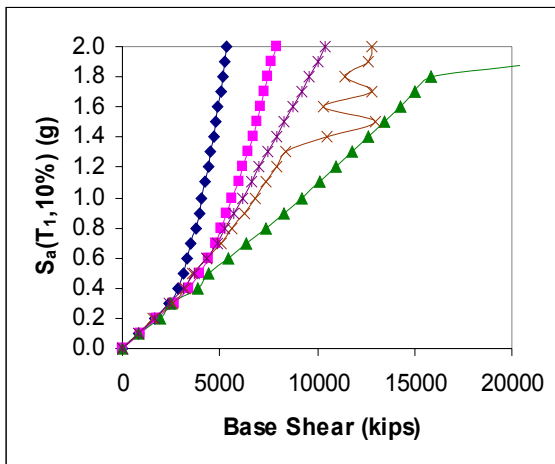


(a)

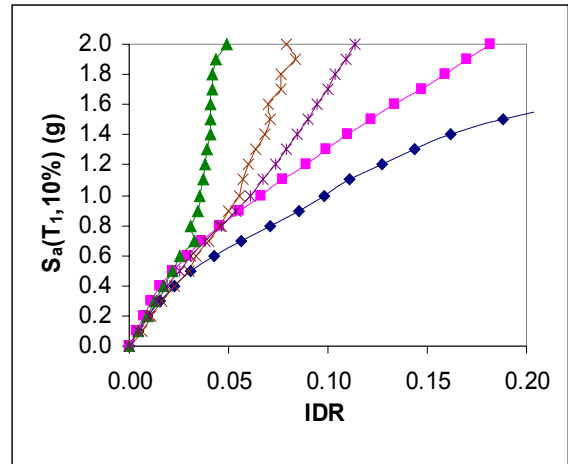


(b)

Figure B.79 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to NF01

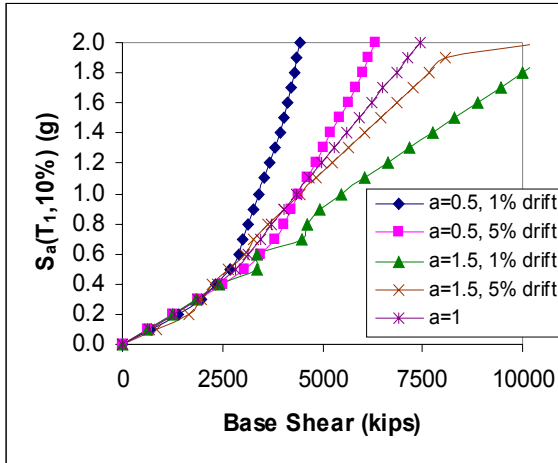


(a)

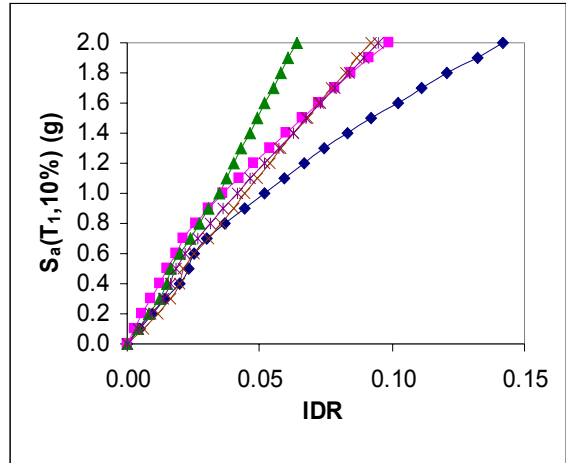


(b)

Figure B.80 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to NF07

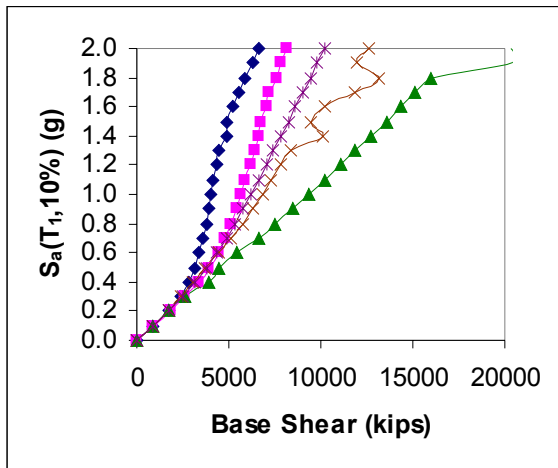


(a)

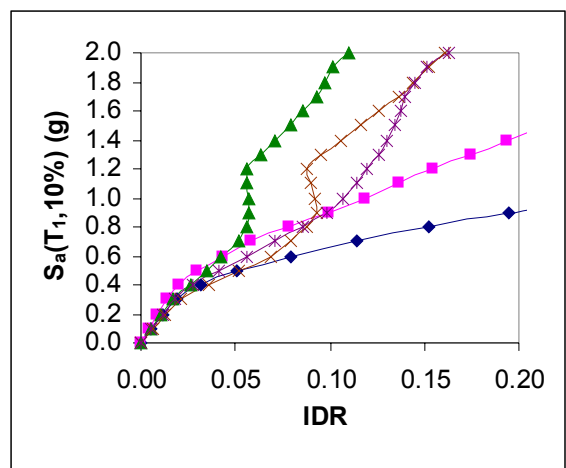


(b)

Figure B.81 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to NF09

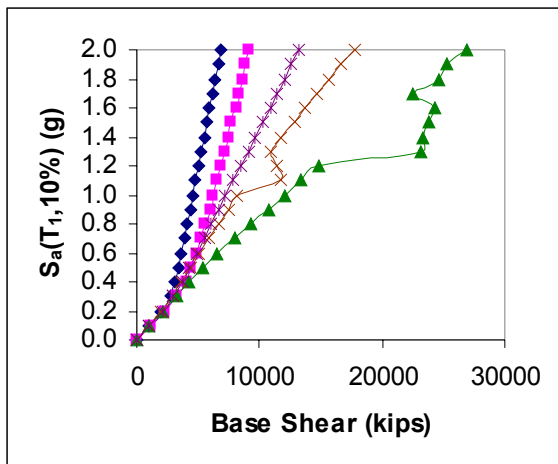


(a)

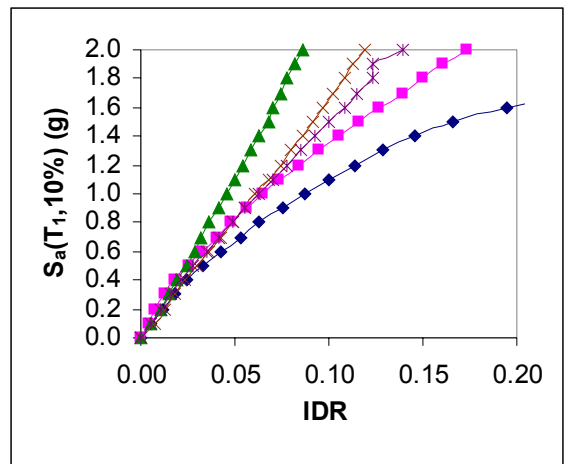


(b)

Figure B.82 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to NF11

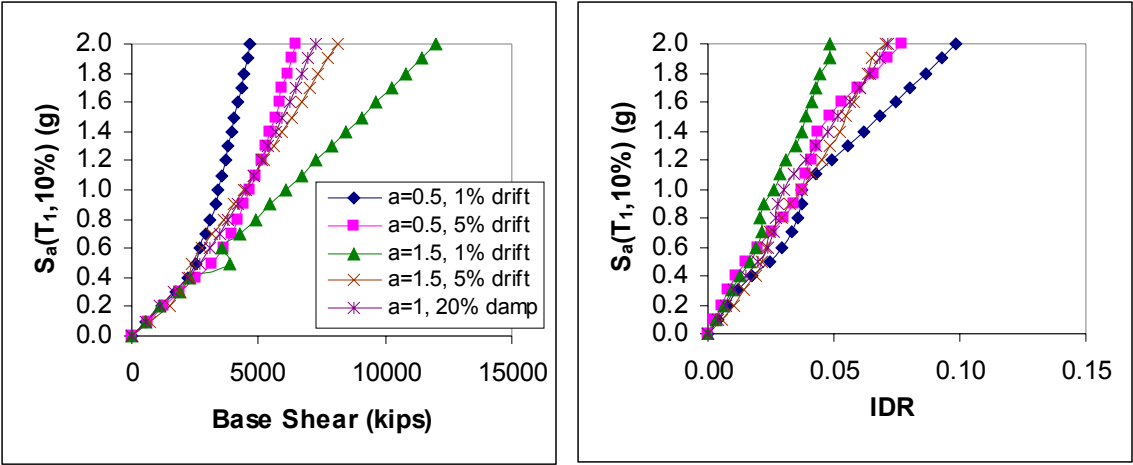


(a)



(b)

Figure B.83 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to NF13



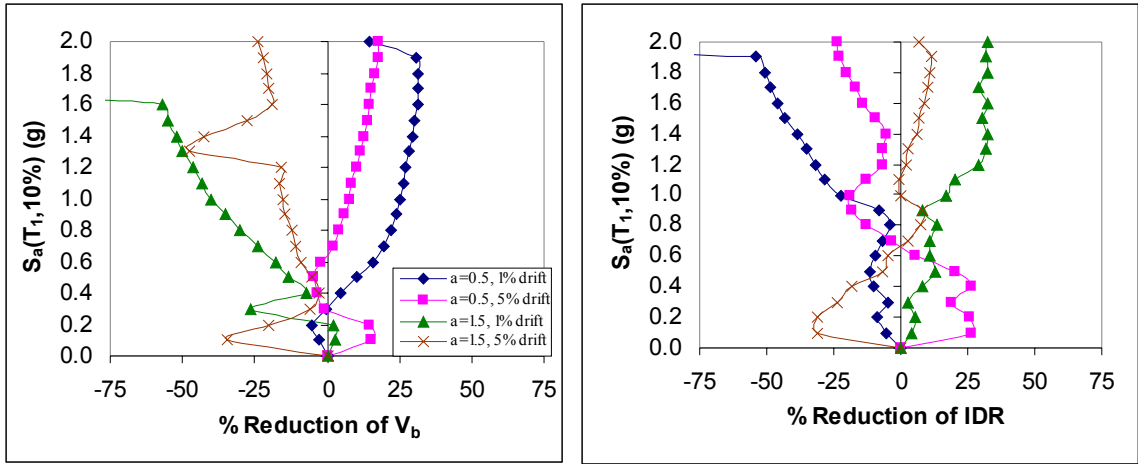
(a)

(b)

Figure B.84 (a-b): IDA Curves for 20% Critically Damped Structure Subjected to NF19

## B.8 Percent Reduction IDA Curves of Base Shear and Drift for Structure with Various Types of Dampers

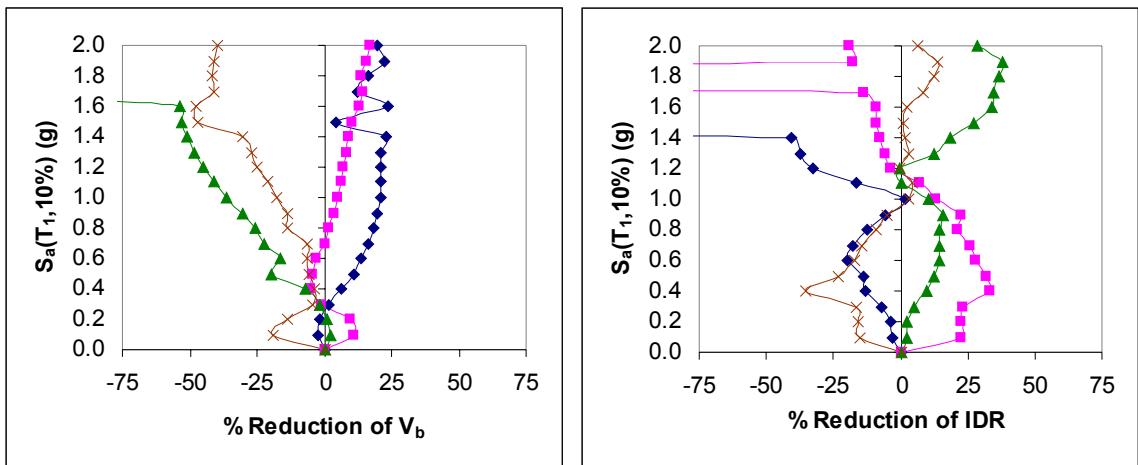
### B.8.1 Percent Reduction IDA Curves for 10% Critical Damping



(a)

(b)

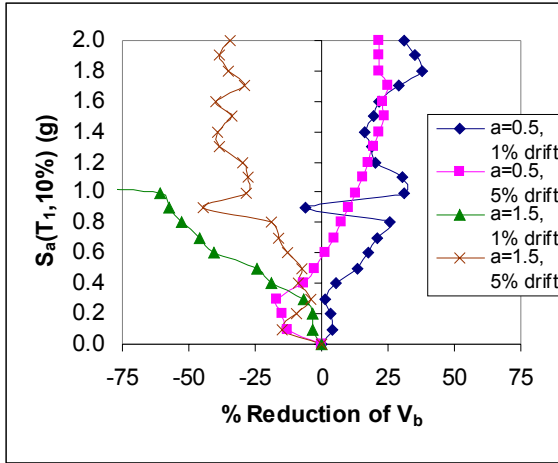
Figure B.85 (a-b): Percent Reduction IDA Curves for 10% Critically Damped LA01



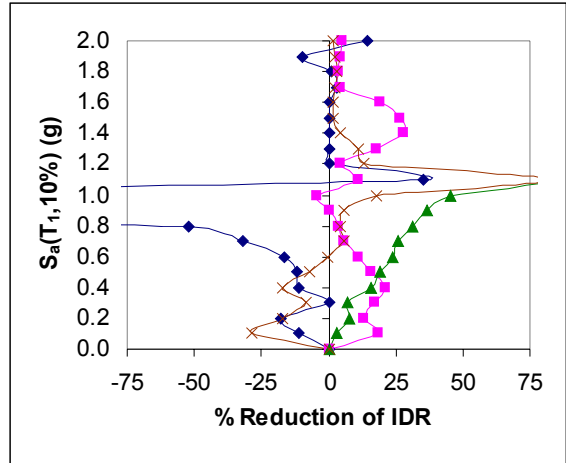
(a)

(b)

Figure B.86 (a-b): Percent Reduction IDA Curves for 10% Critically Damped LA07

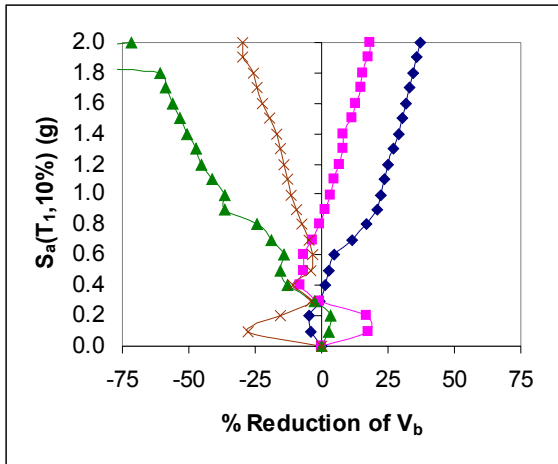


(a)

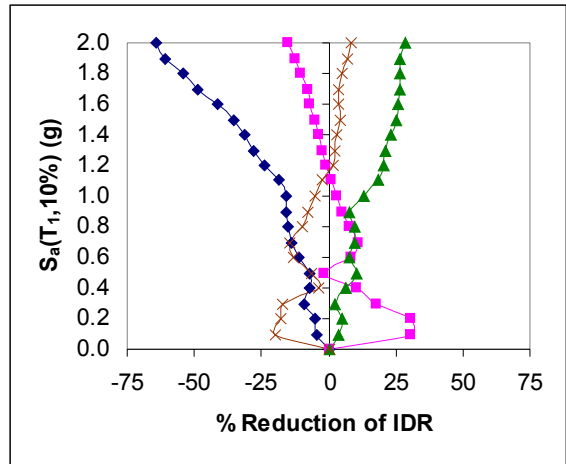


(b)

Figure B.87 (a-b): Percent Reduction IDA Curves for 10% Critically Damped LA10

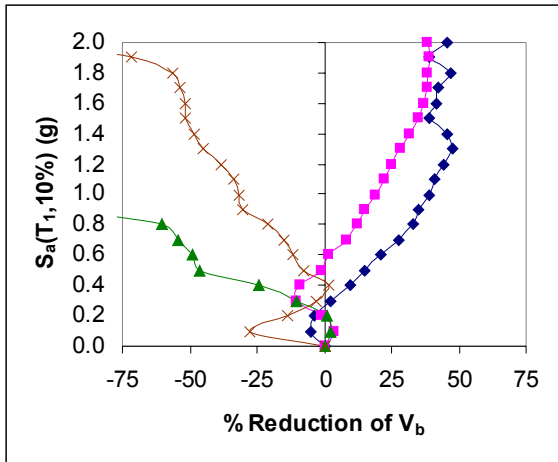


(a)

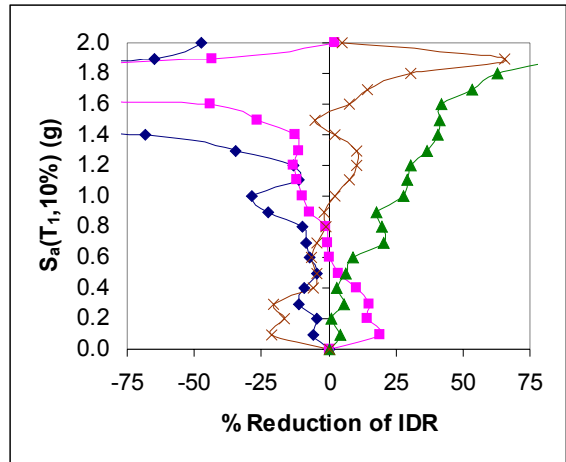


(b)

Figure B.88 (a-b): Percent Reduction IDA Curves for 10% Critically Damped LA11

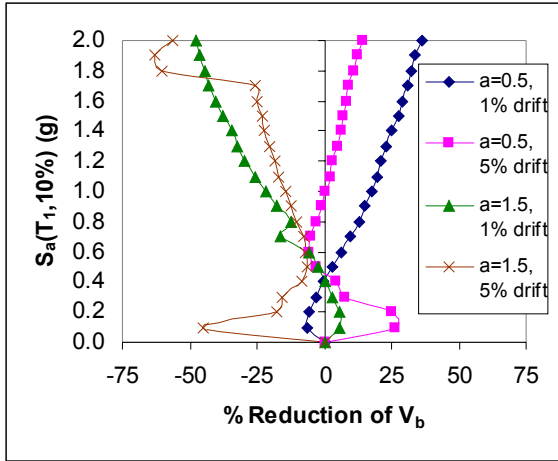


(a)

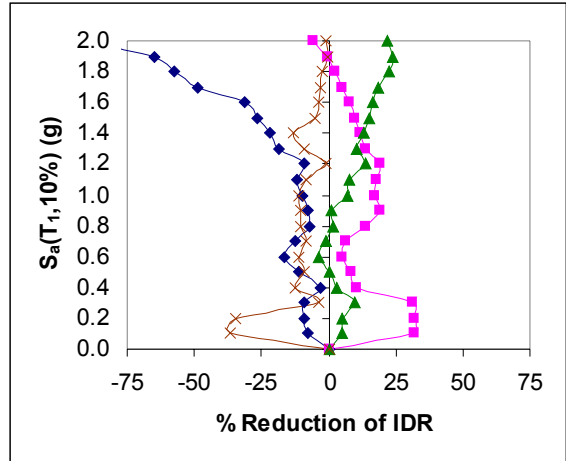


(b)

Figure B.89 (a-b): Percent Reduction IDA Curves for 10% Critically Damped LA13

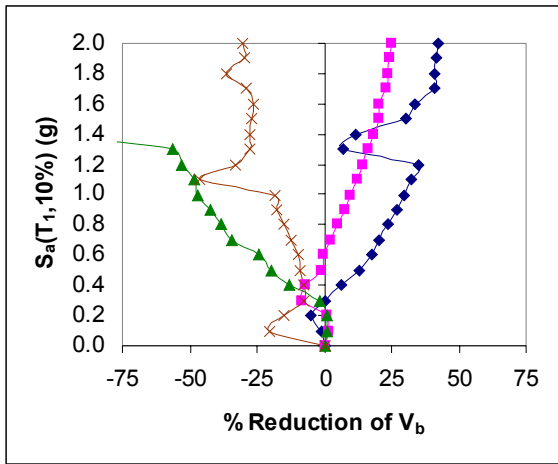


(a)

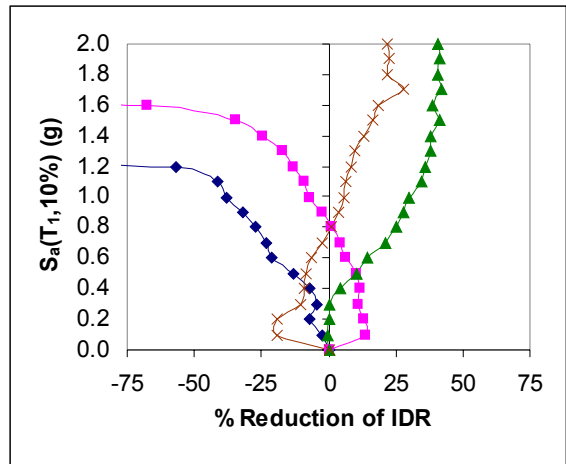


(b)

Figure B.90 (a-b): Percent Reduction IDA Curves for 10% Critically Damped LA17

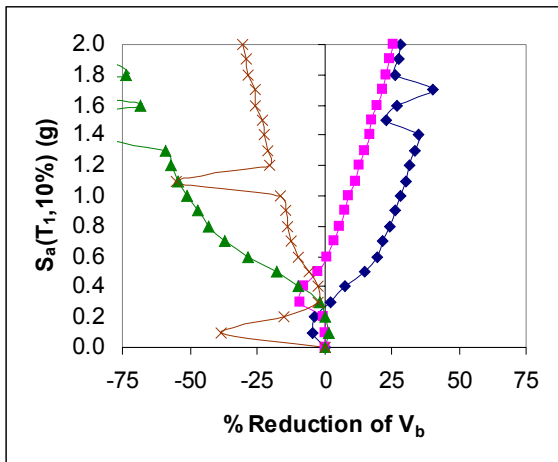


(a)

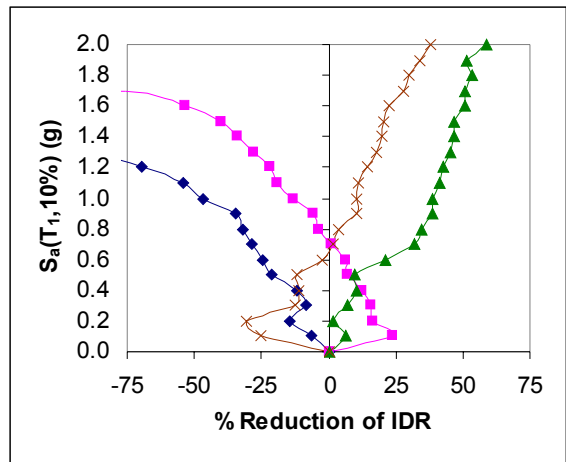


(b)

Figure B.91 (a-b): Percent Reduction IDA Curves for 10% Critically Damped NF01

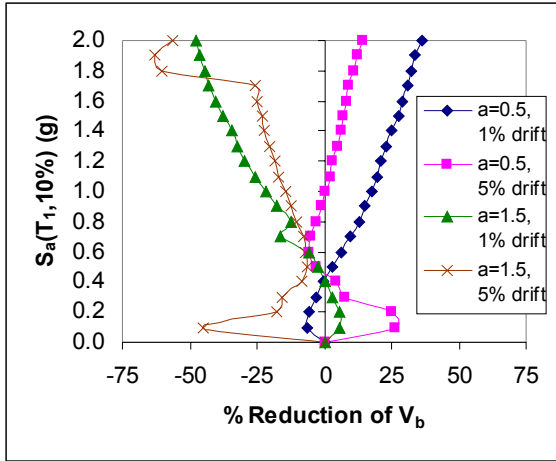


(a)

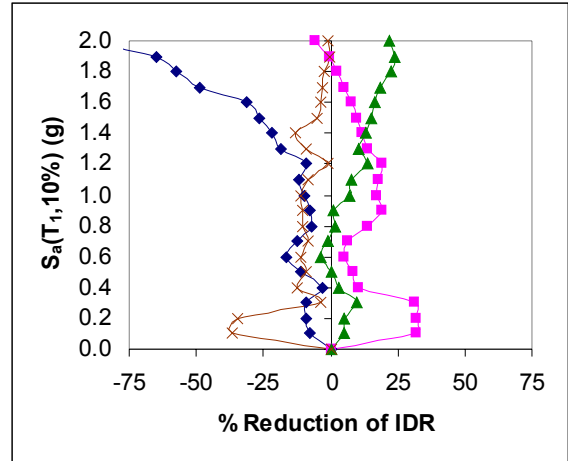


(b)

Figure B.92 (a-b): Percent Reduction IDA Curves for 10% Critically Damped NF07

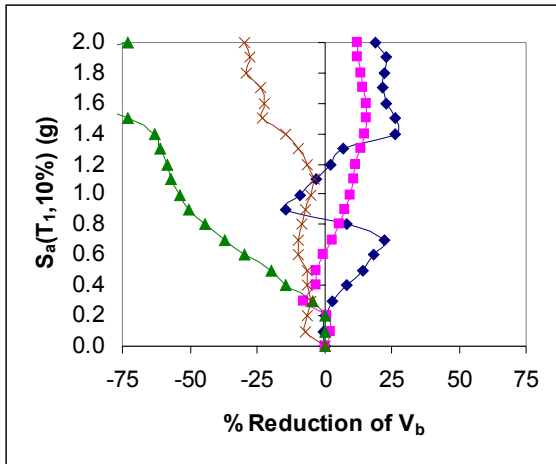


(a)

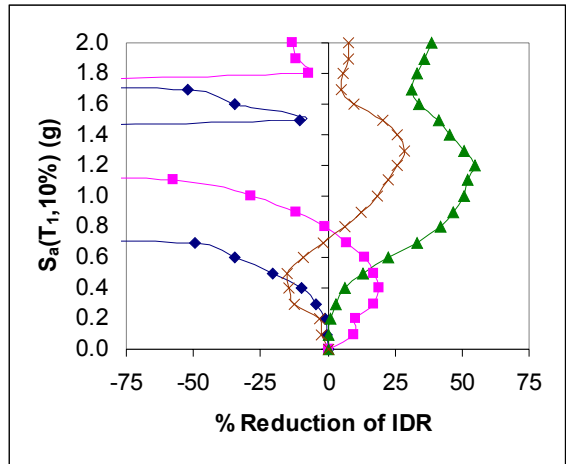


(b)

Figure B.93 (a-b): Percent Reduction IDA Curves for 10% Critically Damped NF09

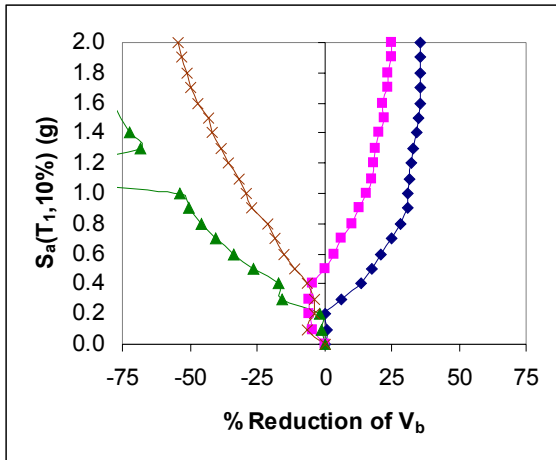


(a)

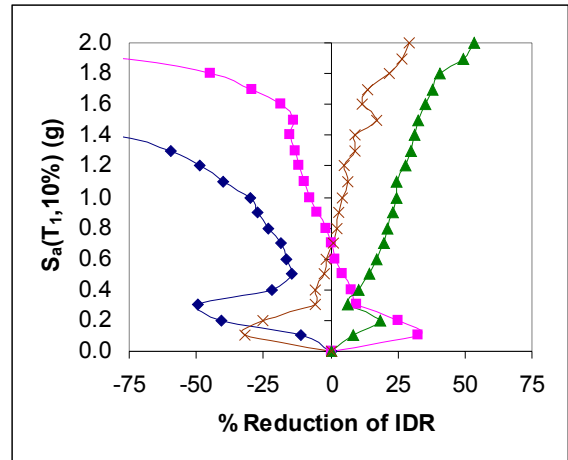


(b)

Figure B.94 (a-b): Percent Reduction IDA Curves for 10% Critically Damped NF11

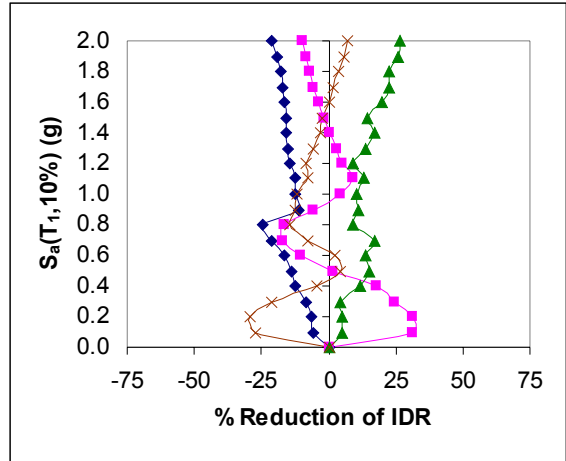
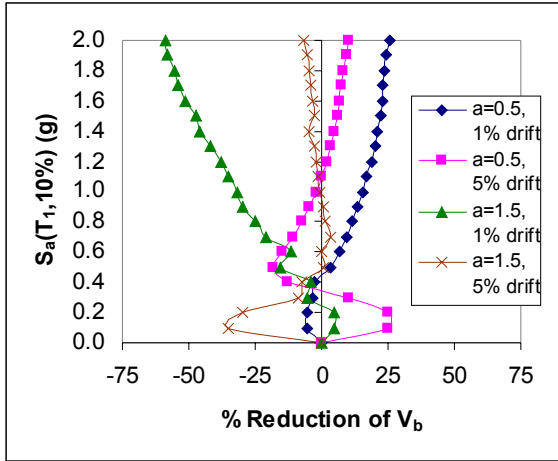


(a)



(b)

Figure B.95 (a-b): Percent Reduction IDA Curves for 10% Critically Damped NF13



(a)

(b)

Figure B.96 (a-b): Percent Reduction IDA Curves for 10% Critically Damped NF19

### B.8.2 Percent Reduction IDA Curves for 20% Critical Damping

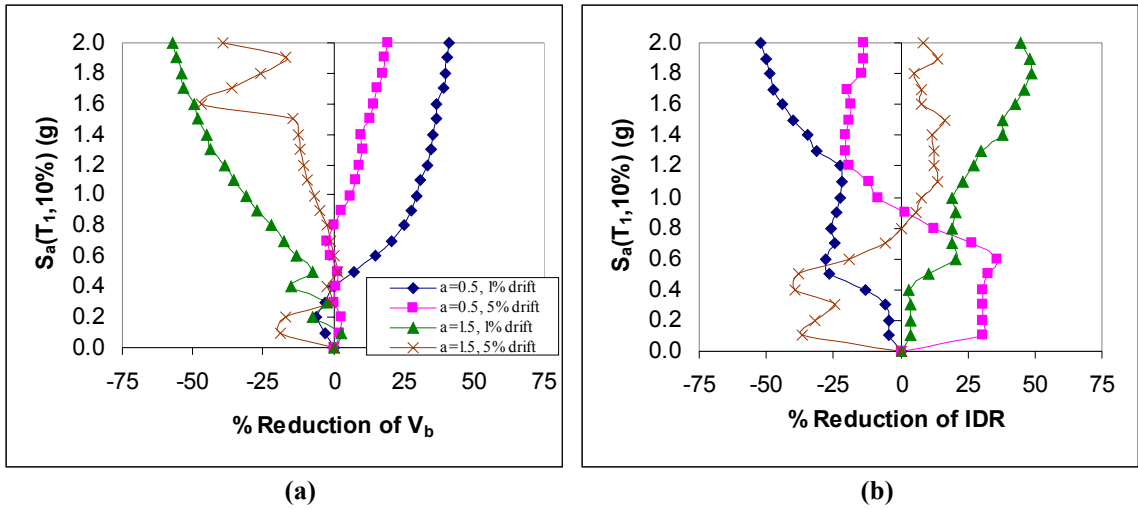


Figure B.97 (a-b): Percent Reduction IDA Curves for 20% Critically Damped LA01

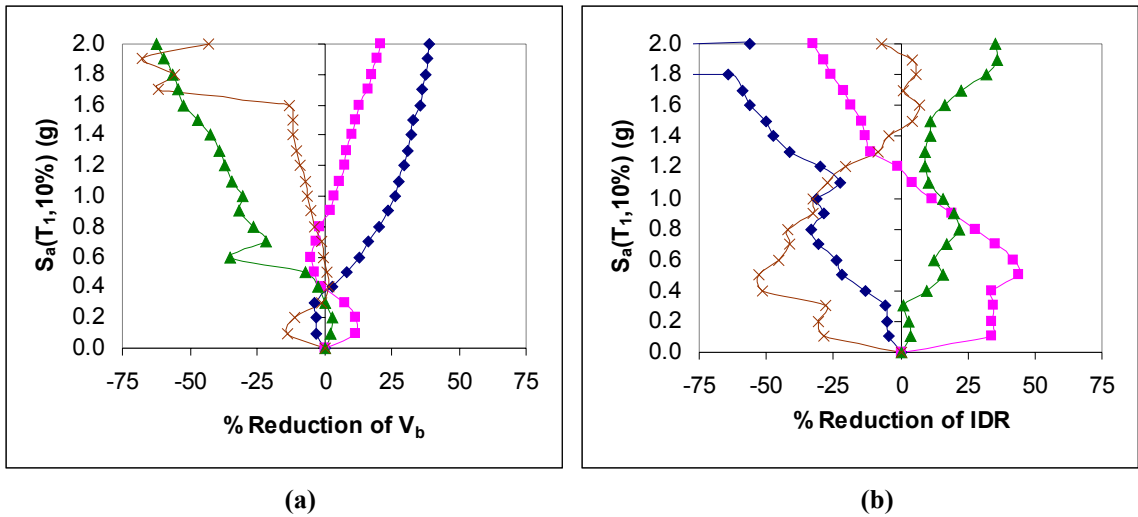
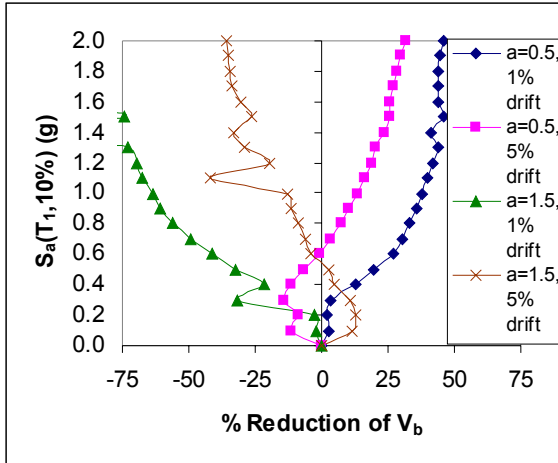
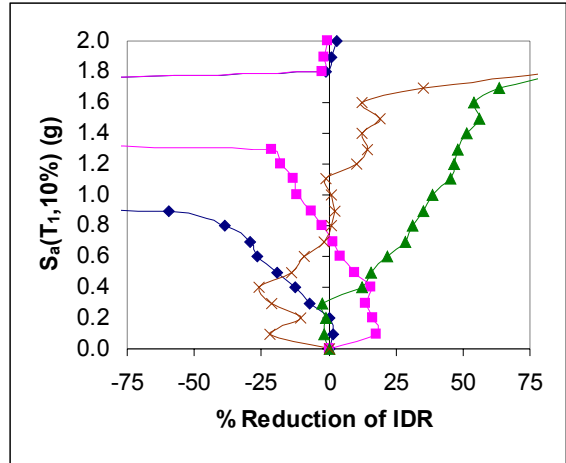


Figure B.98 (a-b): Percent Reduction IDA Curves for 20% Critically Damped LA07

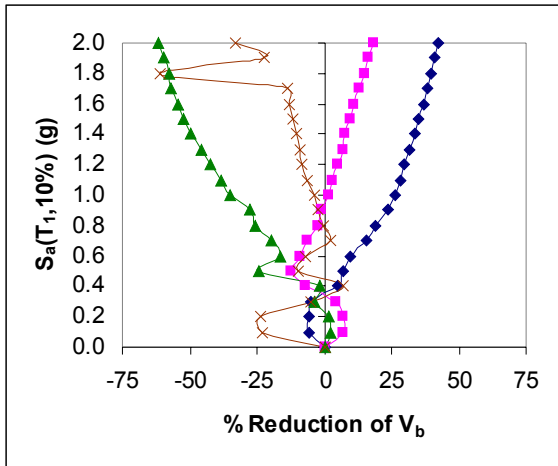


(a)

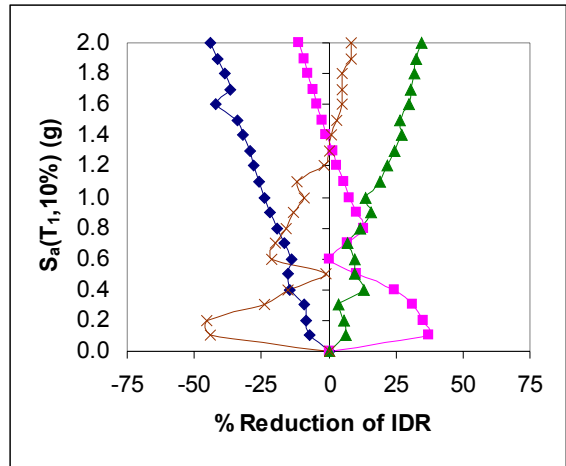


(b)

Figure B.99 (a-b): Percent Reduction IDA Curves for 20% Critically Damped LA10

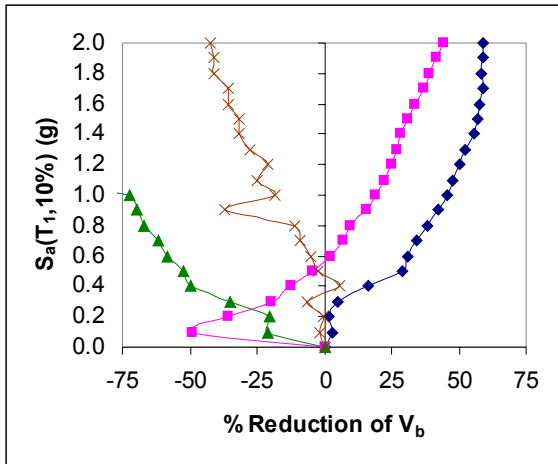


(a)

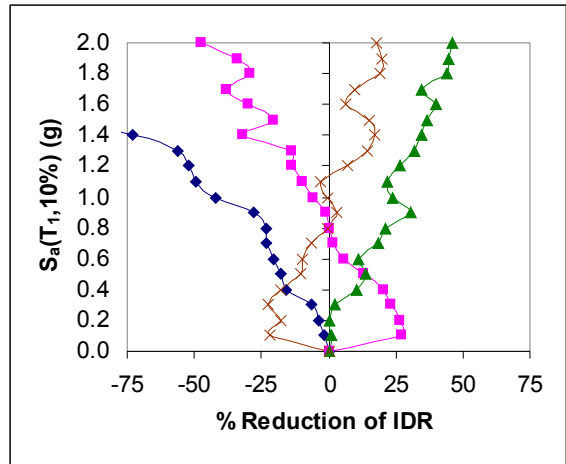


(b)

Figure B.100 (a-b): Percent Reduction IDA Curves for 20% Critically Damped LA11

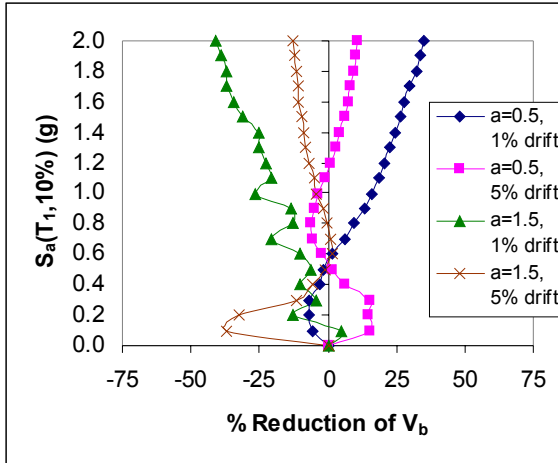


(a)

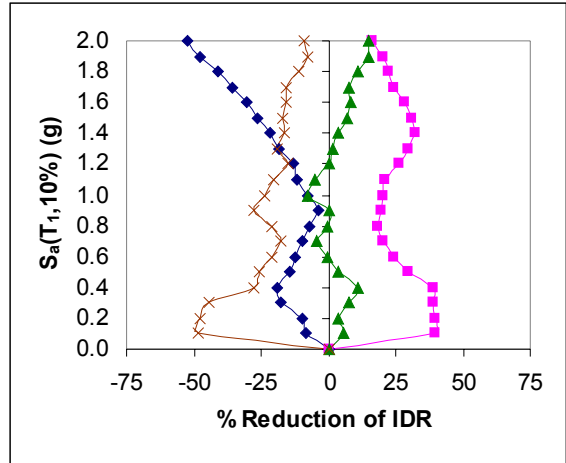


(b)

Figure B.101 (a-b): Percent Reduction IDA Curves for 20% Critically Damped LA13

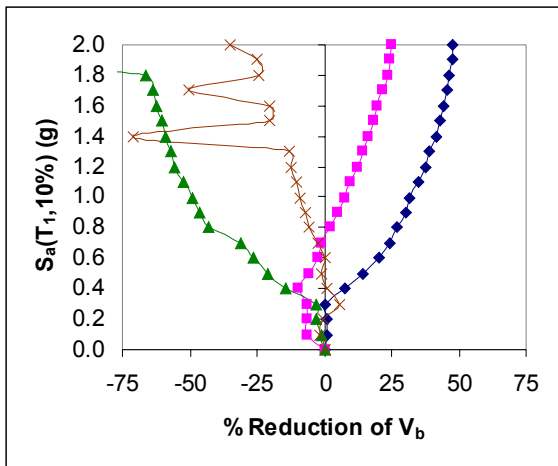


(a)

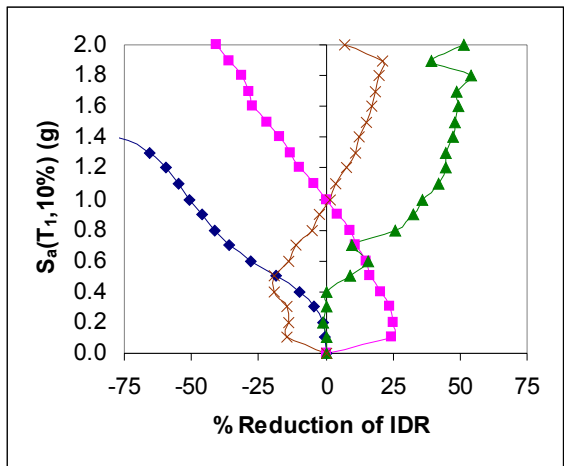


(b)

Figure B.102 (a-b): Percent Reduction IDA Curves for 20% Critically Damped LA17

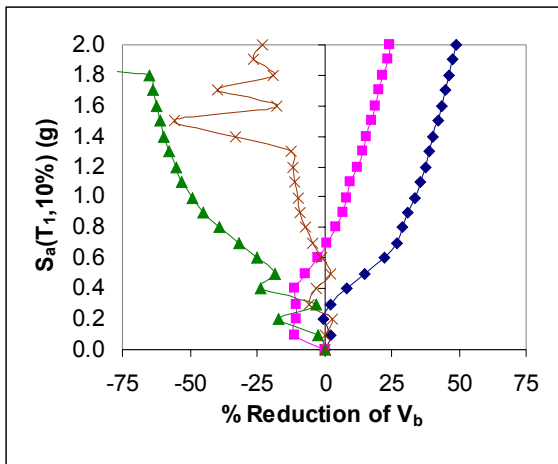


(a)

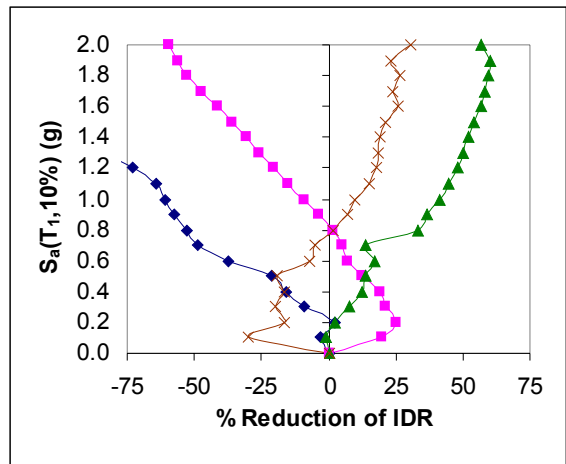


(b)

Figure B.103 (a-b): Percent Reduction IDA Curves for 20% Critically Damped NF01

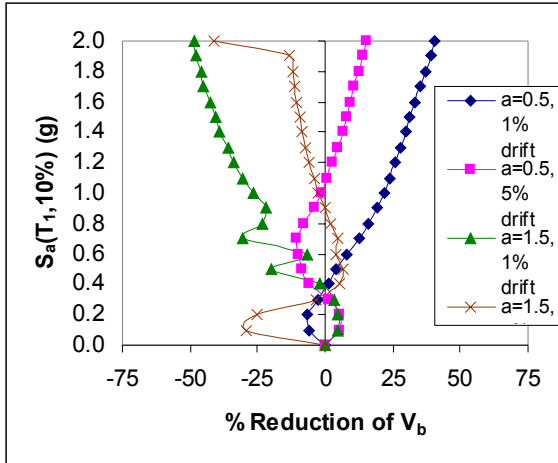


(a)

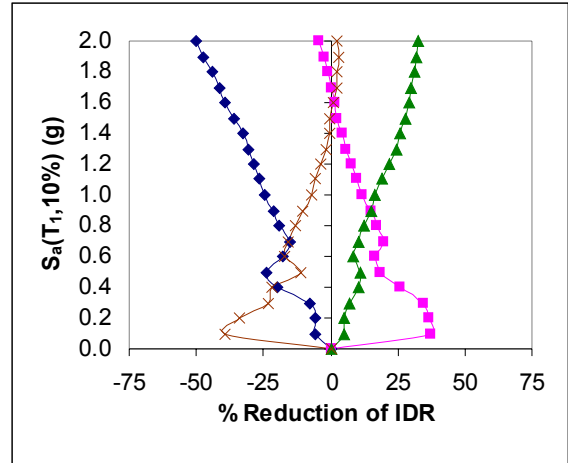


(b)

Figure B.104 (a-b): Percent Reduction IDA Curves for 20% Critically Damped NF07

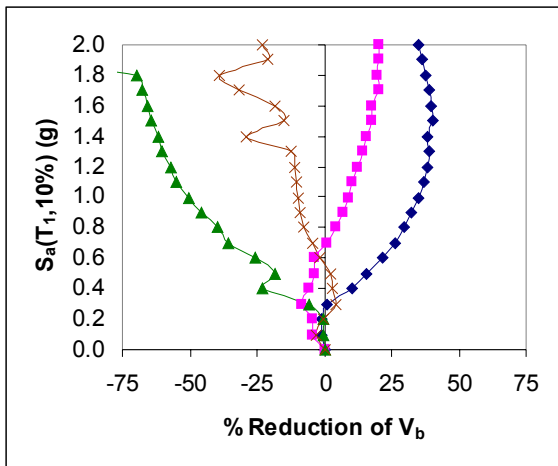


(a)

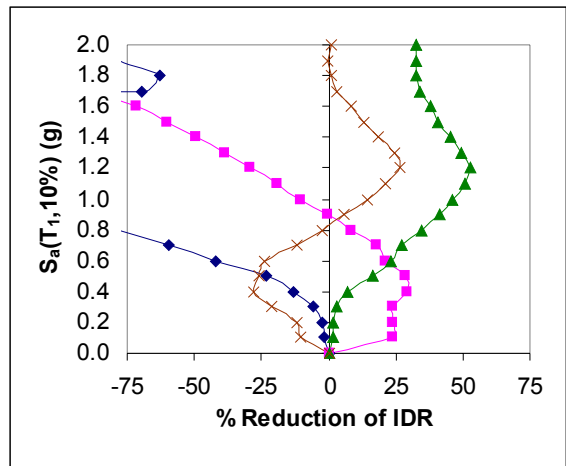


(b)

Figure B.105 (a-b): Percent Reduction IDA Curves for 20% Critically Damped NF09

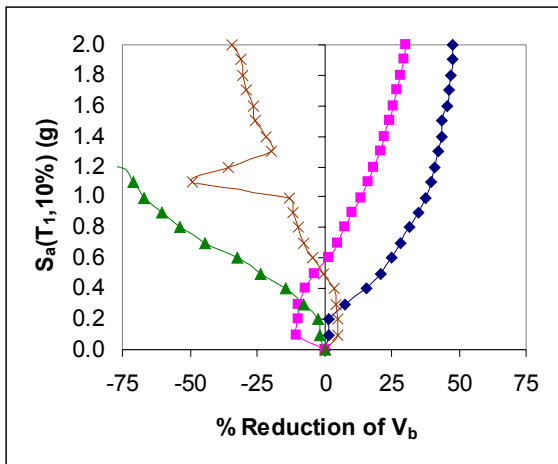


(a)

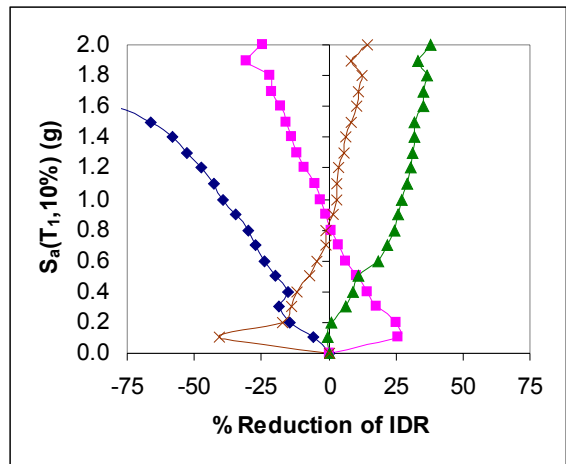


(b)

Figure B.106 (a-b): Percent Reduction IDA Curves for 20% Critically Damped NF11

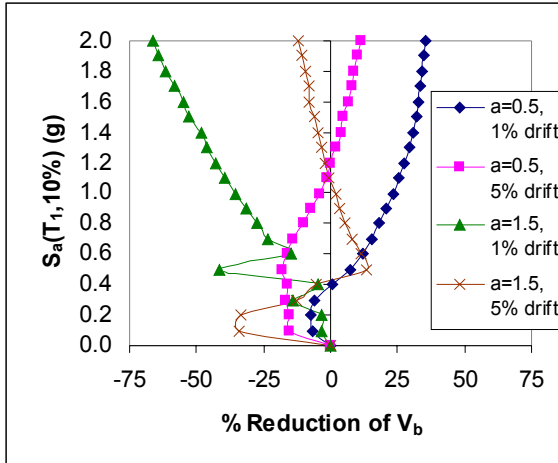


(a)

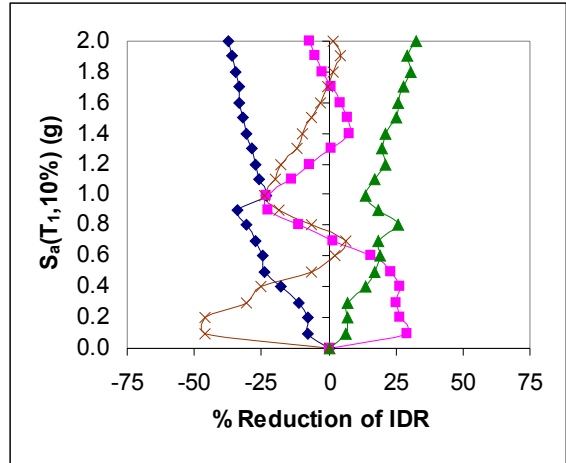


(b)

Figure B.107 (a-b): Percent Reduction IDA Curves for 20% Critically Damped NF13



(a)



(b)

Figure B.108 (a-b): Percent Reduction IDA Curves for 20% Critically Damped NF19

### B.9 Residual Displacement IDA Curves for 20% Critically Damped Structure

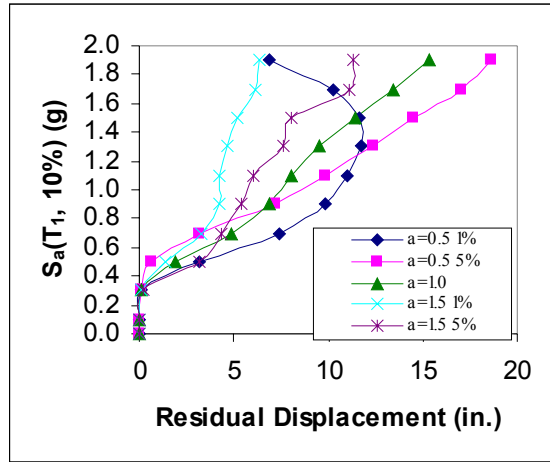


Figure B.109: Residual Displacement IDA for 20% Critically Damped LA01

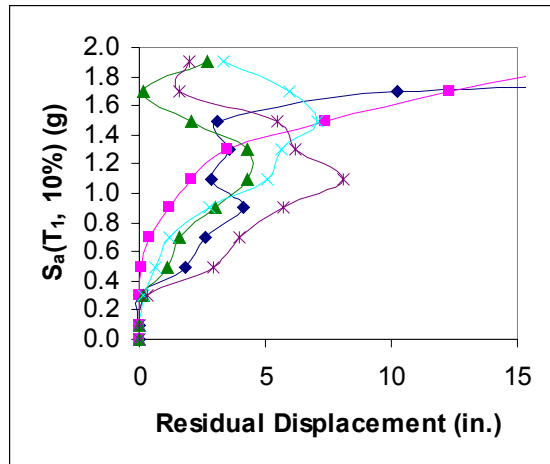


Figure B.110: Residual Displacement IDA for 20% Critically Damped LA07

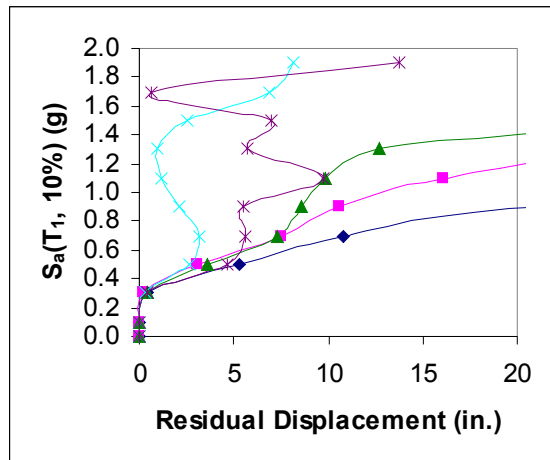


Figure B.111: Residual Displacement IDA for 20% Critically Damped LA10

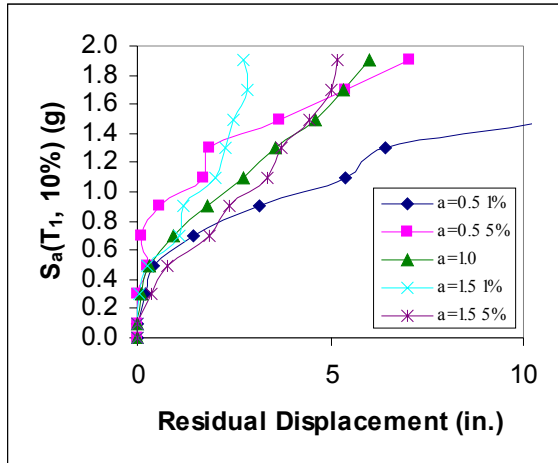


Figure B.112: Residual Displacement IDA for 20% Critically Damped LA11

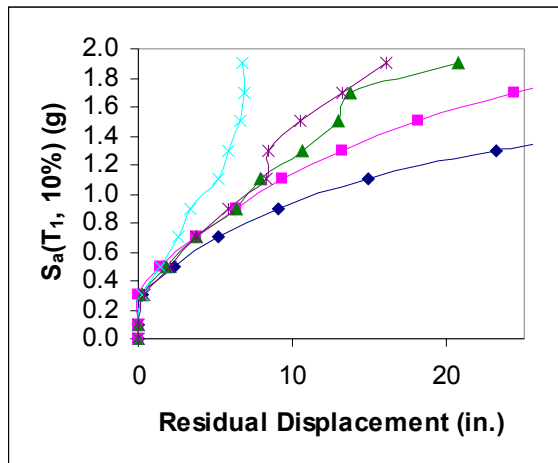


Figure B.113: Residual Displacement IDA for 20% Critically Damped LA13

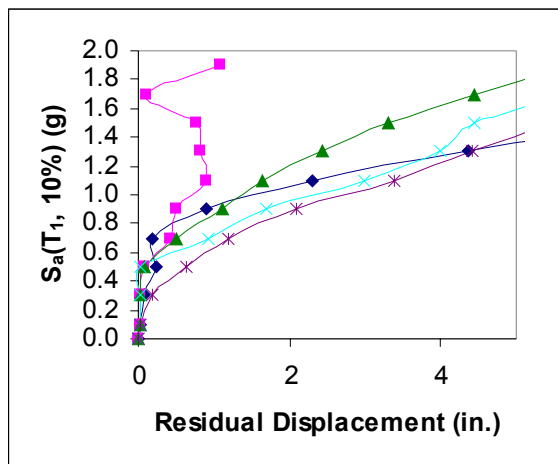


Figure B.114: Residual Displacement IDA for 20% Critically Damped LA17

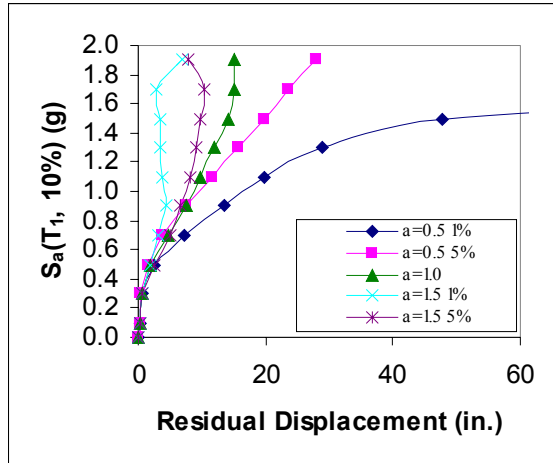


Figure B.115: Residual Displacement IDA for 20% Critically Damped NF01

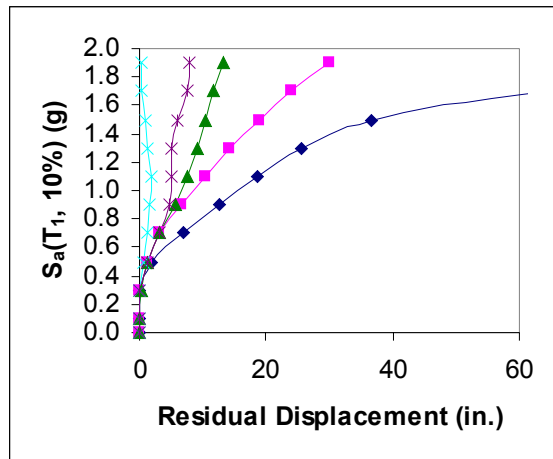


Figure B.116: Residual Displacement IDA for 20% Critically Damped NF07

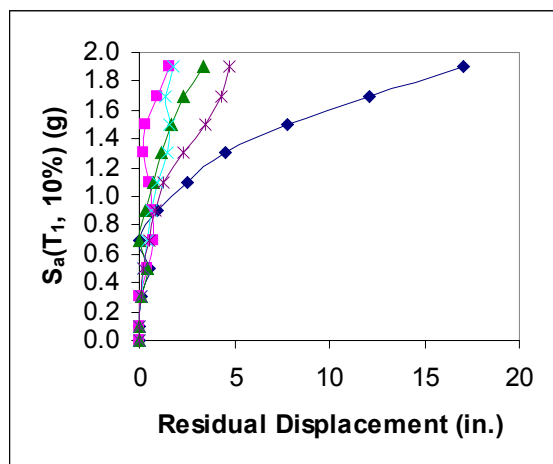


Figure B.117: Residual Displacement IDA for 20% Critically Damped NF09

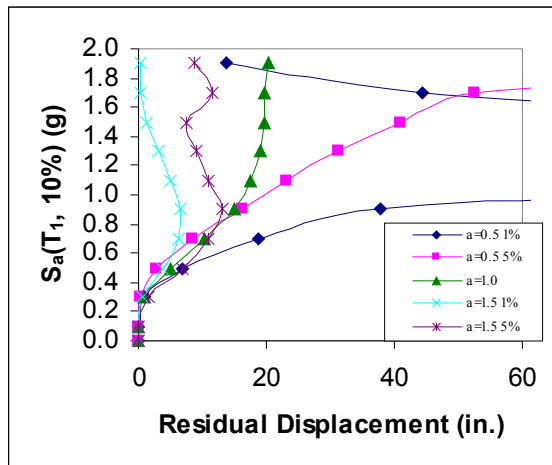


Figure B.118: Residual Displacement IDA for 20% Critically Damped NF11

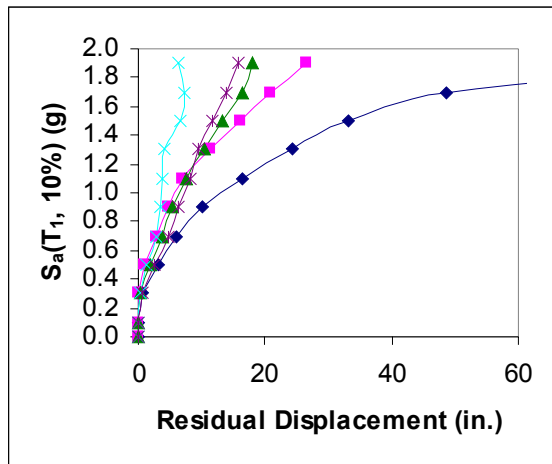


Figure B.119: Residual Displacement IDA for 20% Critically Damped NF13

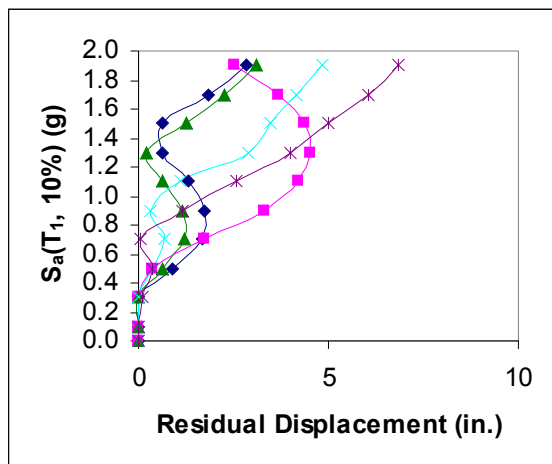


Figure B.120: Residual Displacement IDA for 20% Critically Damped NF19

## B.10 Peak Base Shear and Drift IDA for 20% Critically Damped with Yielding Braces

### B.10.1 Dampers w/ $\alpha=0.5$ at 1% Drift

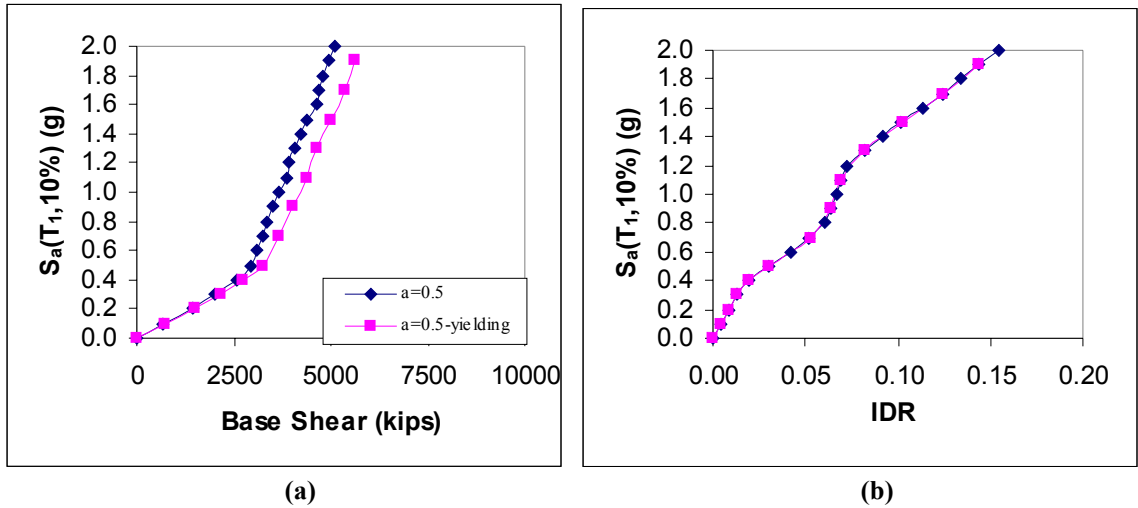


Figure B.121 (a-b): IDA Curves for 20% Critical Damping  $\alpha=0.5$  1% drift w/ Yielding Braces LA01

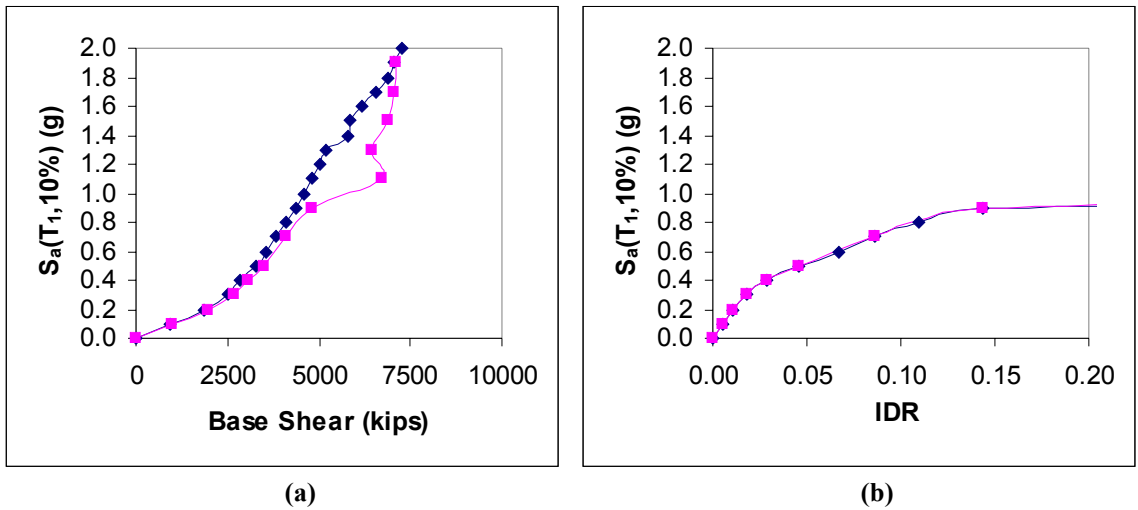
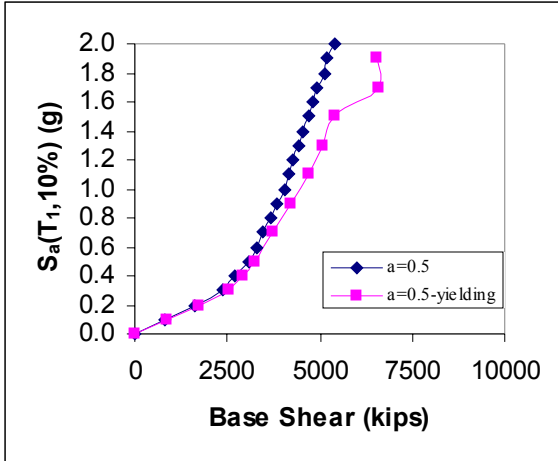
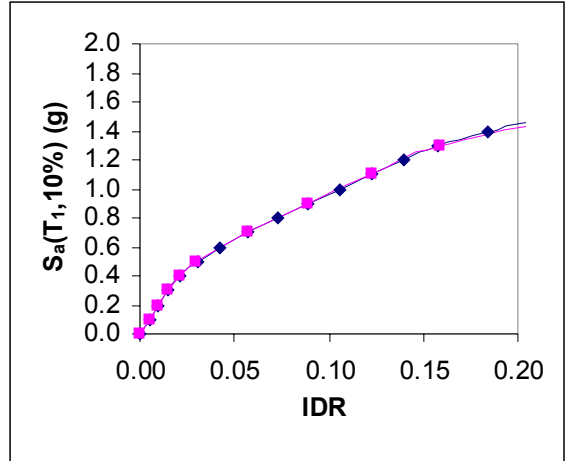


Figure B.122 (a-b): IDA Curves for 20% Critical Damping  $\alpha=0.5$  1% drift w/ Yielding Braces LA10

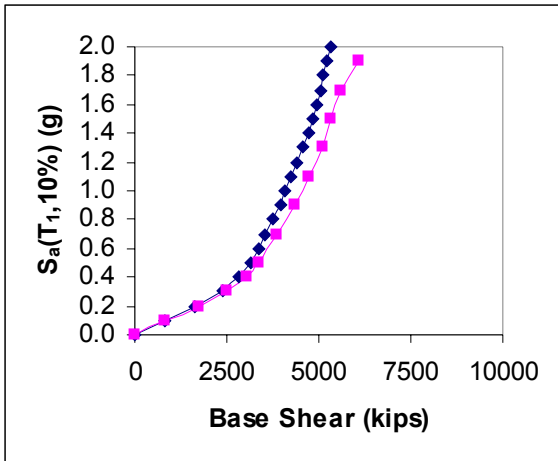


(a)

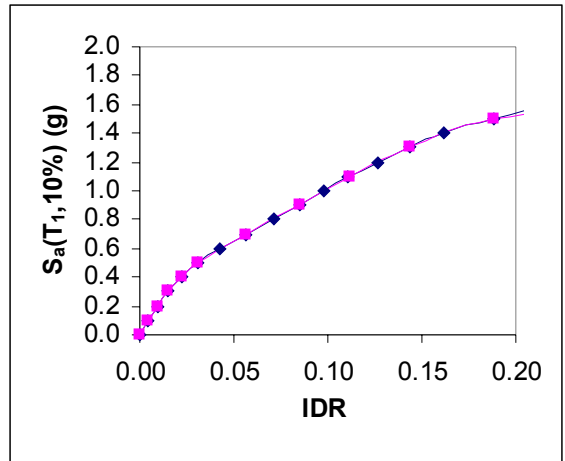


(b)

Figure B.123 (a-b): IDA Curves for 20% Critical Damping  $\alpha=0.5$  1% drift w/ Yielding Braces NF01

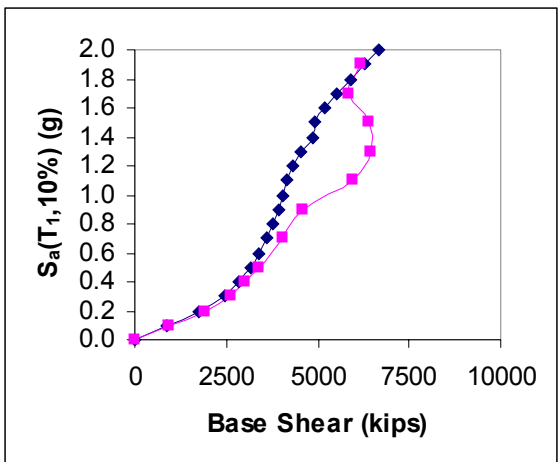


(a)

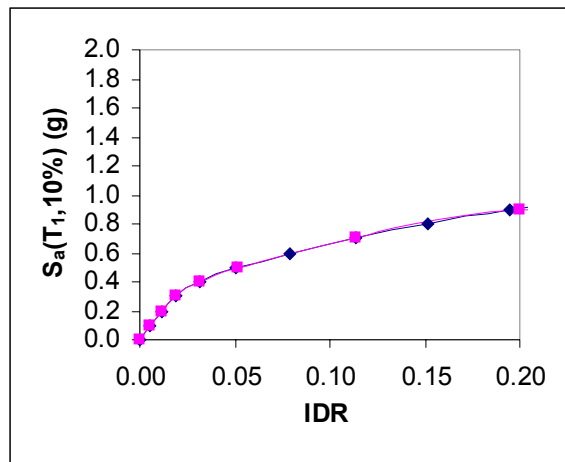


(b)

Figure B.124 (a-b): IDA Curves for 20% Critical Damping  $\alpha=0.5$  1% drift w/ Yielding Braces NF07



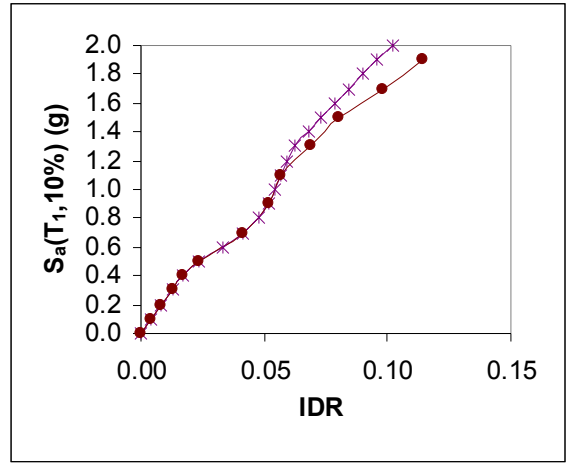
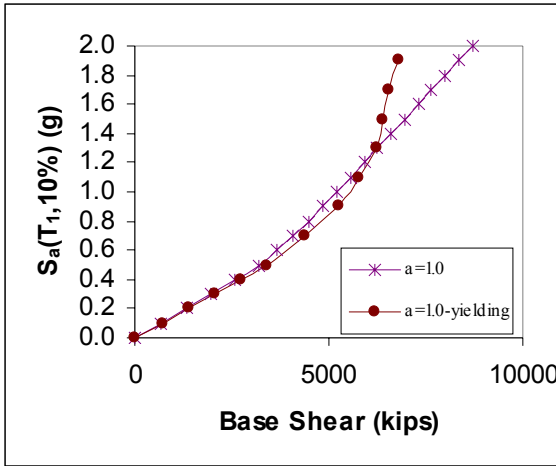
(a)



(b)

Figure B.125 (a-b): IDA Curves for 20% Critical Damping  $\alpha=0.5$  1% drift w/ Yielding Braces NF07

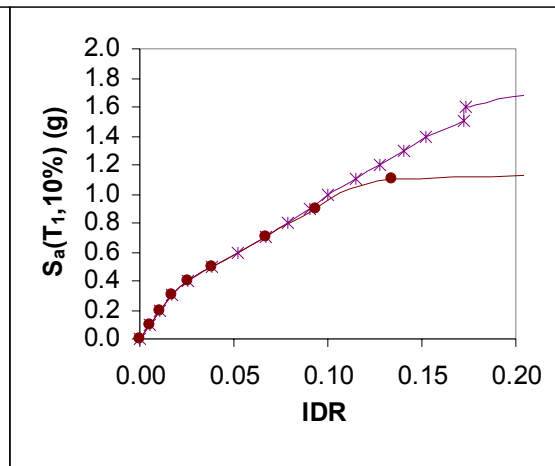
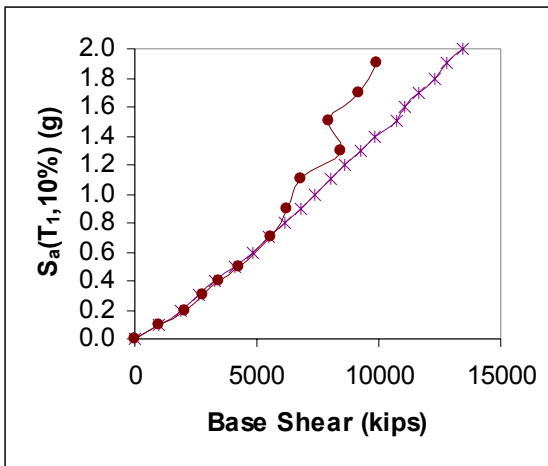
**B.10.2 Dampers with  $\alpha=1.0$**



(a)

(b)

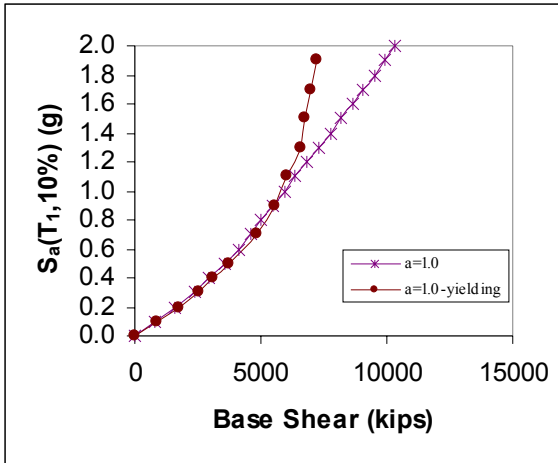
**Figure B.126 (a-b): IDA Curves for 20% Critical Damping  $\alpha=1.0$  w/ Yielding Braces LA01**



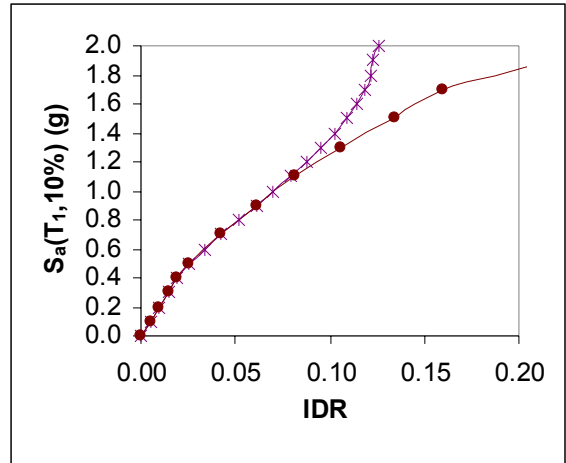
(a)

(b)

**Figure B.127 (a-b): IDA Curves for 20% Critical Damping  $\alpha=1.0$  w/ Yielding Braces LA10**

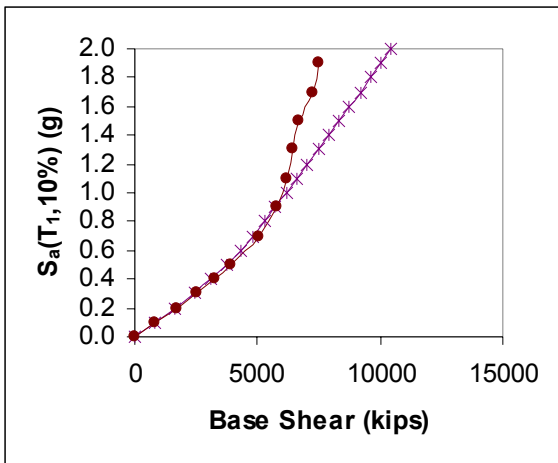


(a)

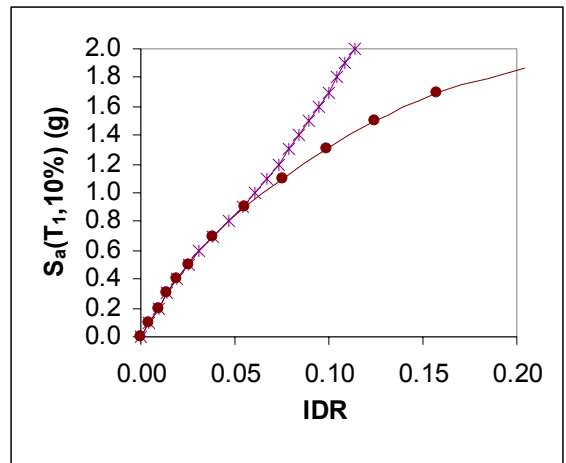


(b)

Figure B.128 (a-b): IDA Curves for 20% Critical Damping  $\alpha=1.0$  w/Yielding Braces NF01

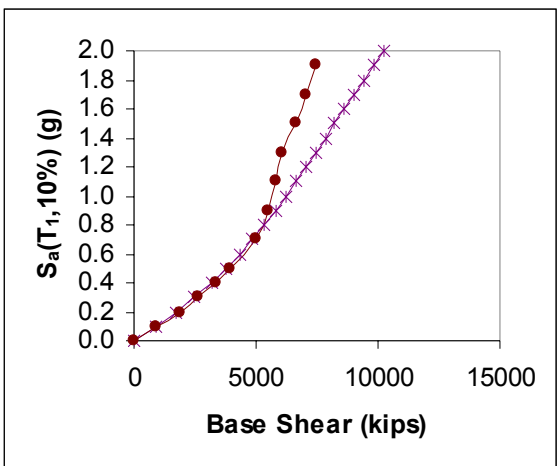


(a)

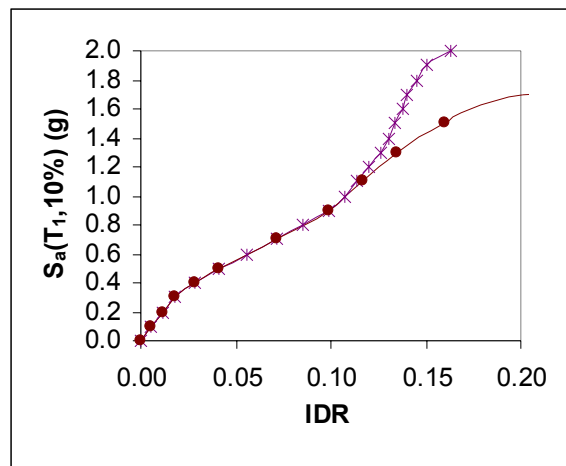


(b)

Figure B.129 (a-b): IDA Curves for 20% Critical Damping  $\alpha=1.0$  w/ Yielding Braces NF07



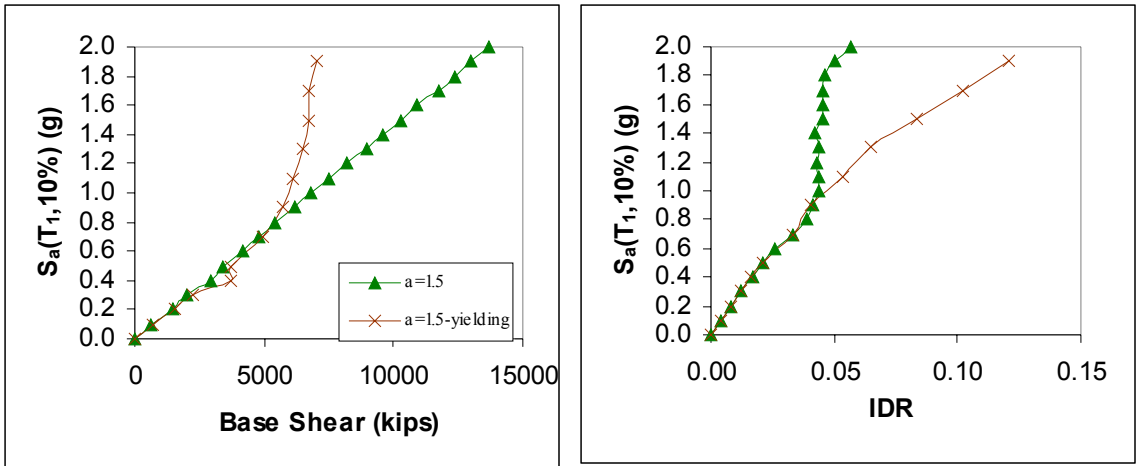
(a)



(b)

Figure B.130 (a-b): IDA Curves for 20% Critical Damping  $\alpha=1.0$  w/ Yielding Braces NF07

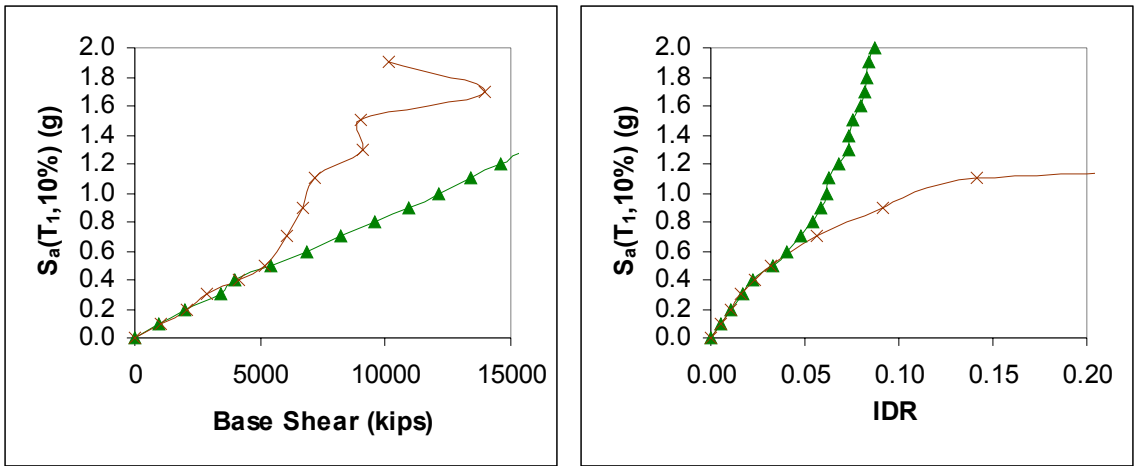
**B.10.1 Dampers with  $\alpha=1.5$  at 1%**



(a)

(b)

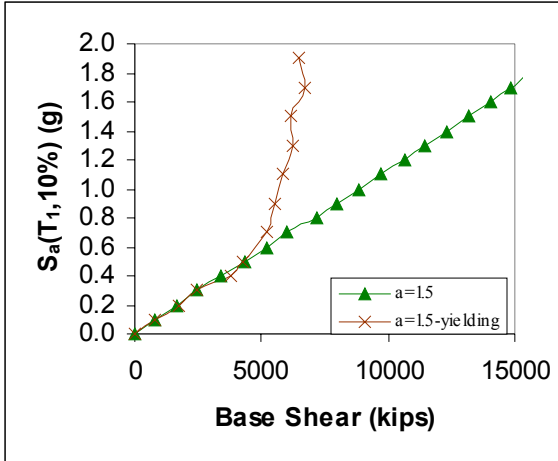
**Figure B.131 (a-b): IDA Curves for 20% Critical Damping  $\alpha=1.5$  1% drift w/ Yielding Braces LA01**



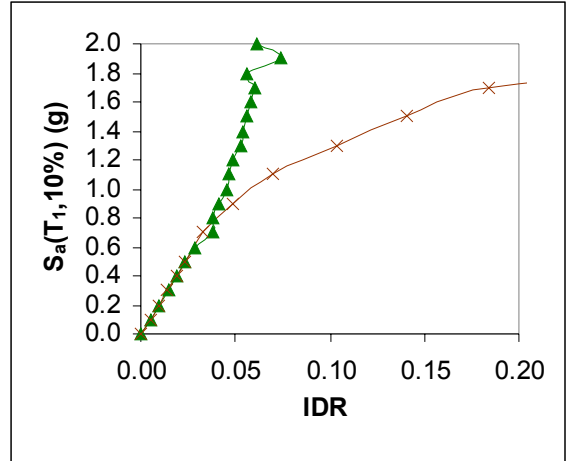
(a)

(b)

**Figure B.132 (a-b): IDA Curves for 20% Critical Damping  $\alpha=1.5$  1% drift w/ Yielding Braces LA10**

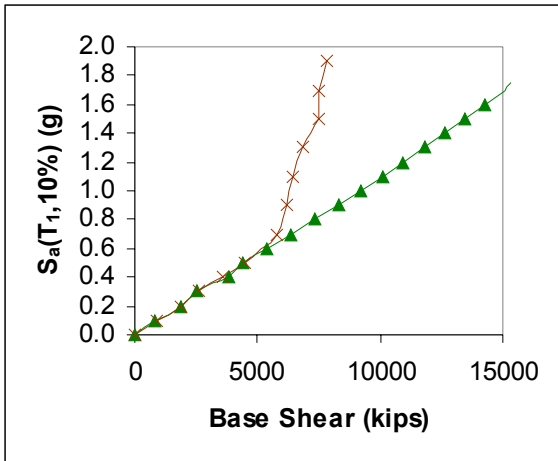


(a)

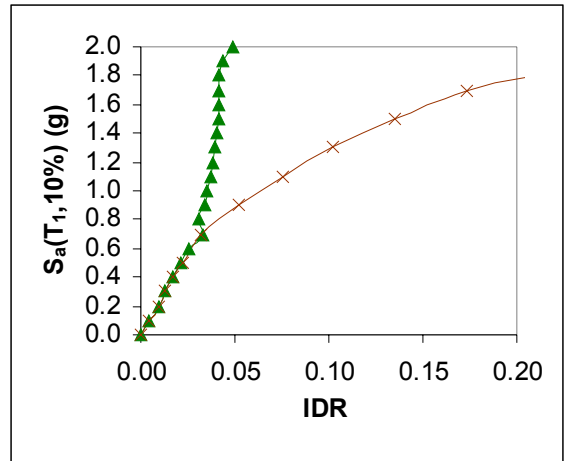


(b)

Figure B.133 (a-b): IDA Curves for 20% Critical Damping  $\alpha=1.5$  1% drift w/ Yielding Braces NF01

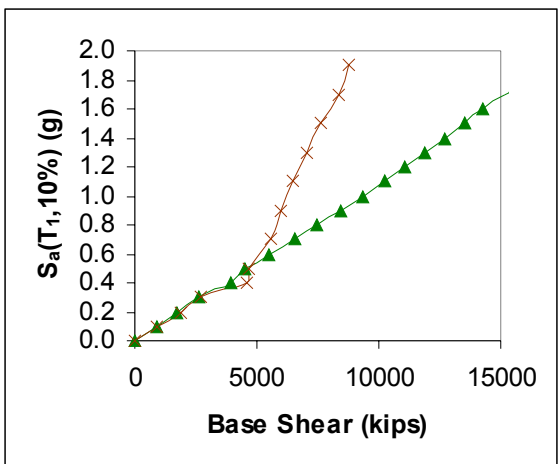


(a)

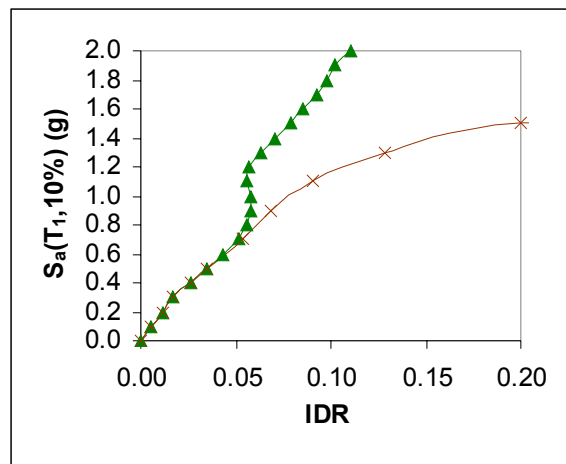


(b)

Figure B.134 (a-b): IDA Curves for 20% Critical Damping  $\alpha=1.5$  1% drift w/ Yielding Braces NF07



(a)



(b)

Figure B.135 (a-b): IDA Curves for 20% Critical Damping  $\alpha=1.5$  1% drift w/ Yielding Braces NF07

## B.11 Residual Displacement IDA Curves for 20% Critically Damped Structure with Yielding Braces

### B.11.1 Dampers with $\alpha=0.5$ at 1% Drift

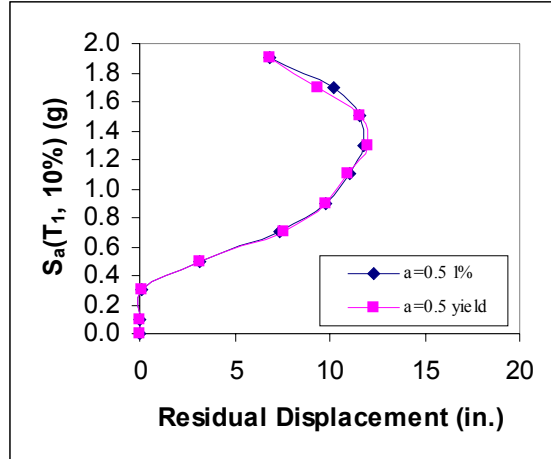


Figure B.136: RD-IDA 20% Critically Damped  $\alpha=0.5$  at 1% Drift w/Yielding Braces LA01

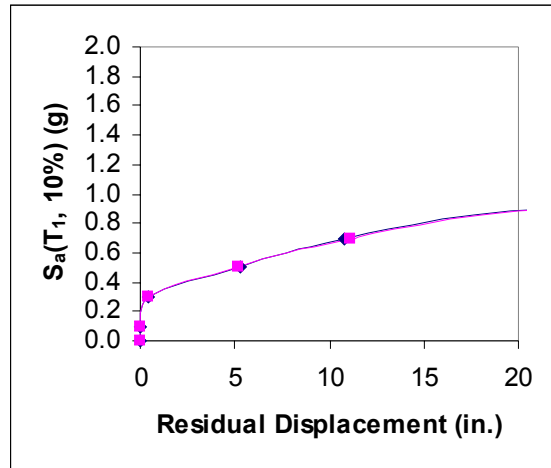


Figure B.137: RD-IDA 20% Critically Damped  $\alpha=0.5$  at 1% Drift w/Yielding Braces LA10

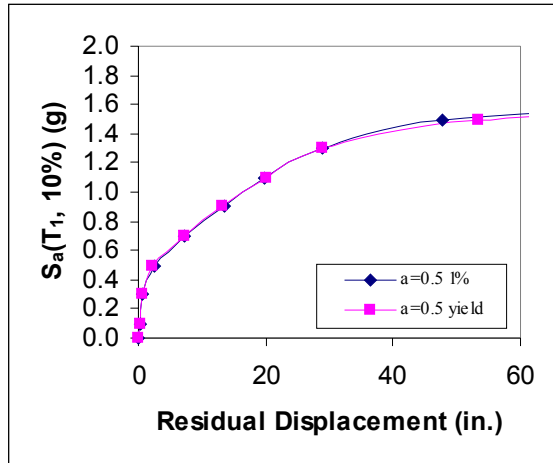


Figure B.138: RD-IDA 20% Critically Damped  $\alpha=0.5$  at 1% Drift w/Yielding Braces NF01

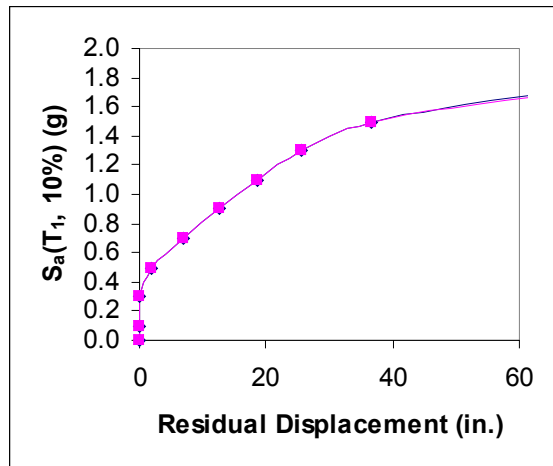


Figure B.139: RD-IDA 20% Critically Damped  $\alpha=0.5$  at 1% Drift w/Yielding Braces NF07

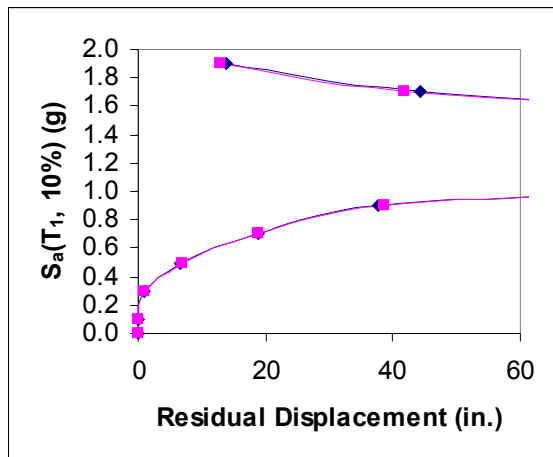


Figure B.140: RD-IDA 20% Critically Damped  $\alpha=0.5$  at 1% Drift w/Yielding Braces NF11

### B.11.2 Dampers with $\alpha=1.0$

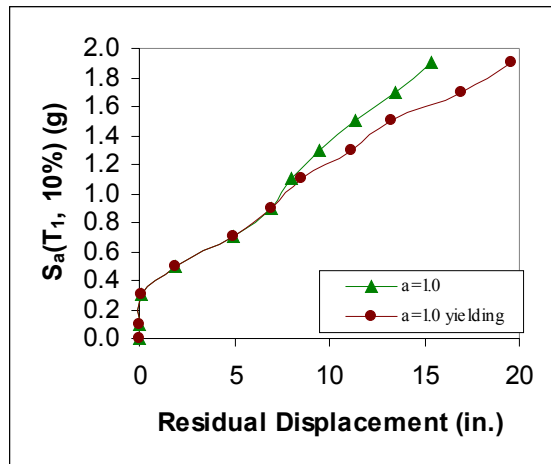


Figure B.141: RD-IDA 20% Critically Damped  $\alpha=1.0$  w/Yielding Braces LA01

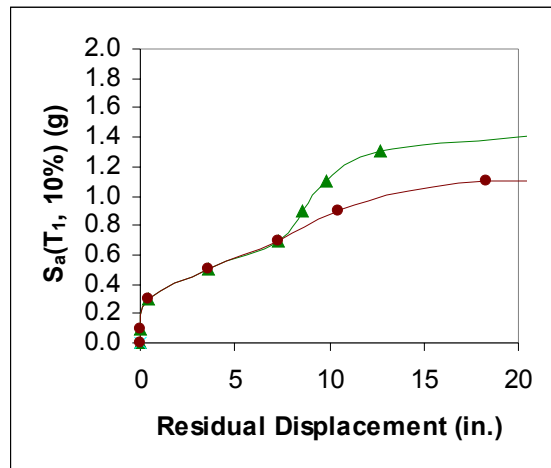


Figure B.142: RD-IDA 20% Critically Damped  $\alpha=1.0$  w/Yielding Braces LA10

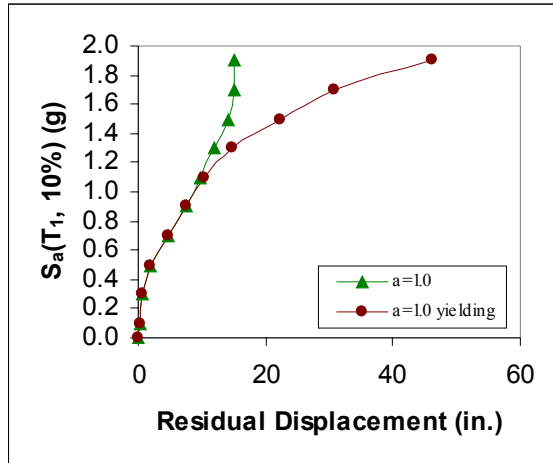


Figure B.143: RD-IDA 20% Critically Damped  $\alpha=1.0$  w/Yielding Braces NF01

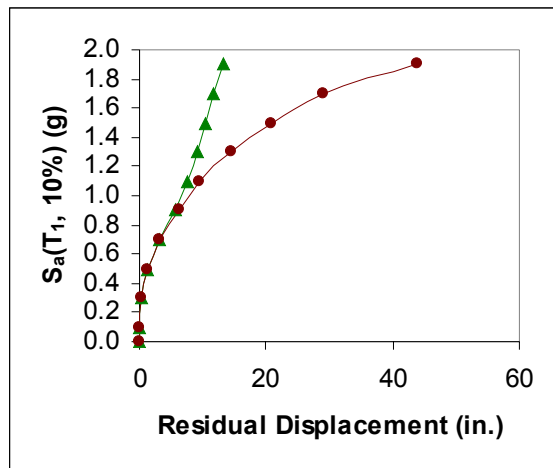


Figure B.144: RD-IDA 20% Critically Damped  $\alpha=1.0$  w/Yielding Braces NF07

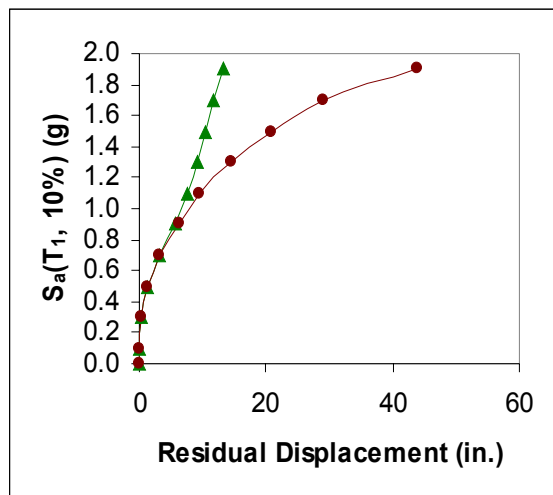


Figure B.145: RD-IDA 20% Critically Damped  $\alpha=1.0$  w/Yielding Braces NF11

### B.11.3 Dampers with $\alpha=1.5$ at 1% Drift

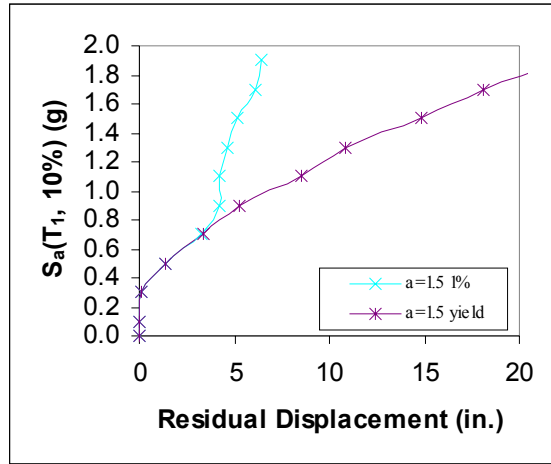


Figure B.146: RD-IDA 20% Critically Damped  $\alpha=1.5$  at 1% Drift w/Yielding Braces LA01

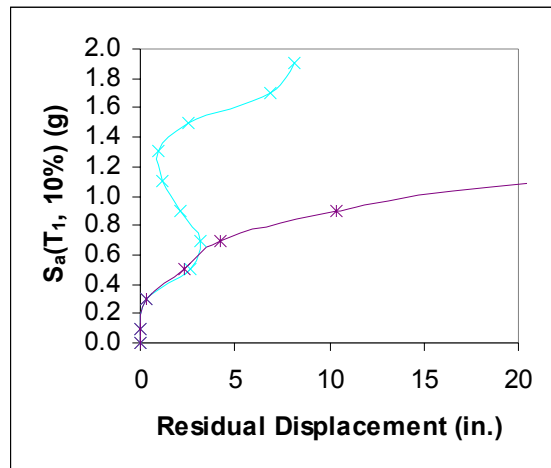


Figure B.147: RD-IDA 20% Critically Damped  $\alpha=1.5$  at 1% Drift w/Yielding Braces LA10

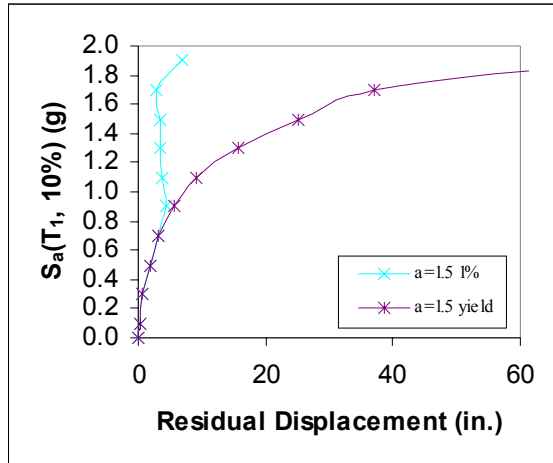


Figure B.148: RD-IDA 20% Critically Damped  $\alpha=1.5$  at 1% Drift w/Yielding Braces NF01

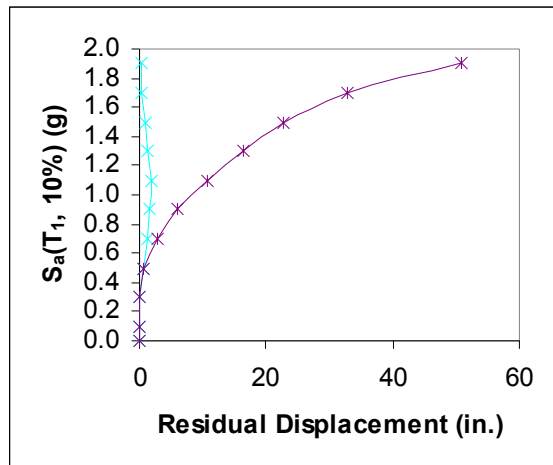


Figure B.149: RD-IDA 20% Critically Damped  $\alpha=1.5$  at 1% Drift w/Yielding Braces NF07

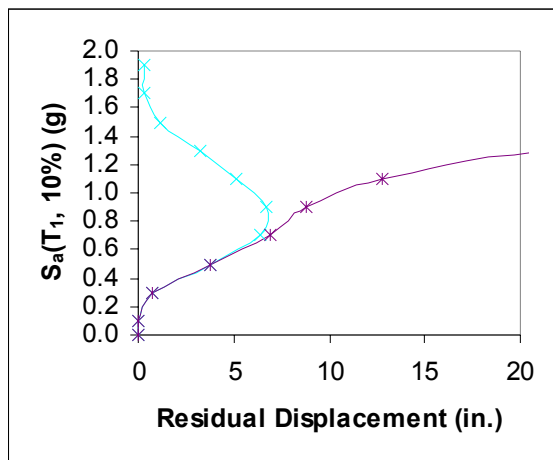


Figure B.150: RD-IDA 20% Critically Damped  $\alpha=1.5$  at 1% Drift w/Yielding Braces NF11

## B.12 Park and Ang Damage Index IDA Curves

### B.12.1 Multi-Record Damage Index IDA Curves

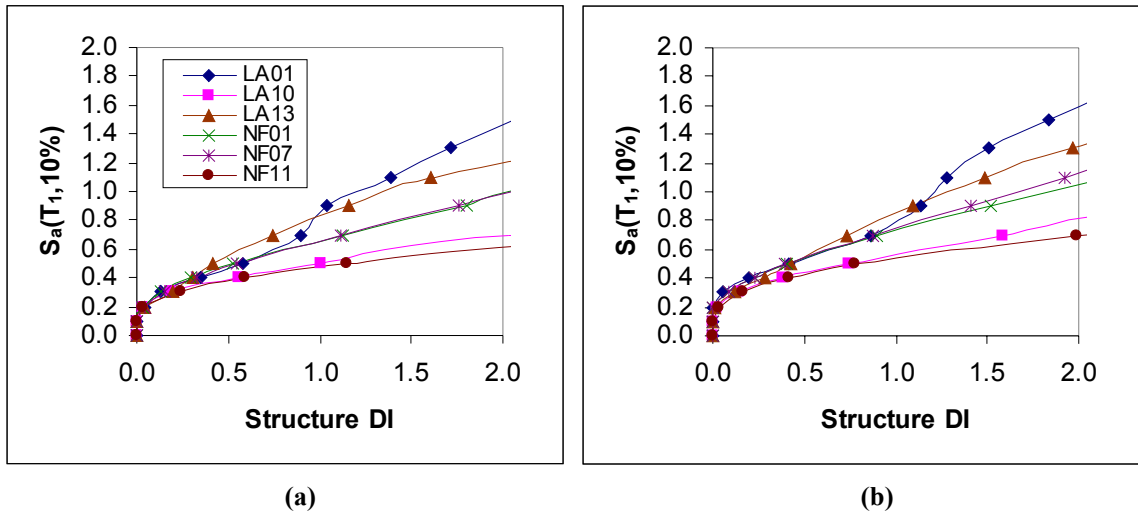


Figure B.151 (a-b): DI-IDA Curves for 10% (a) and 20% (b)  $\alpha=0.5$  at 1% Drift

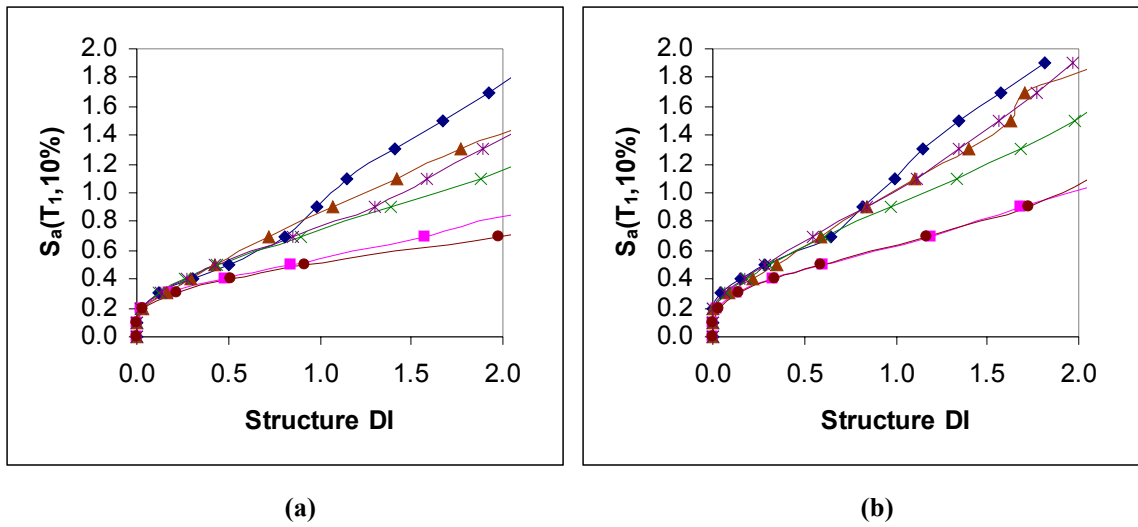
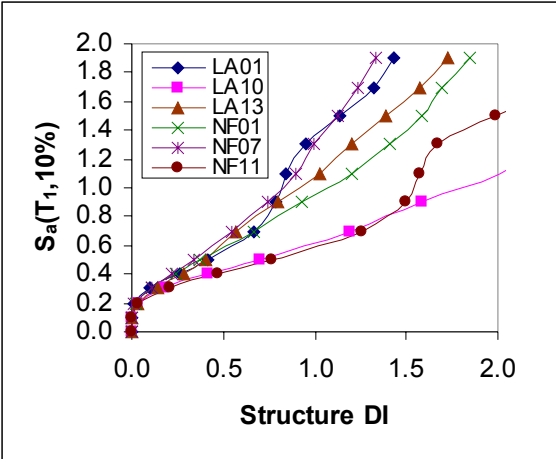
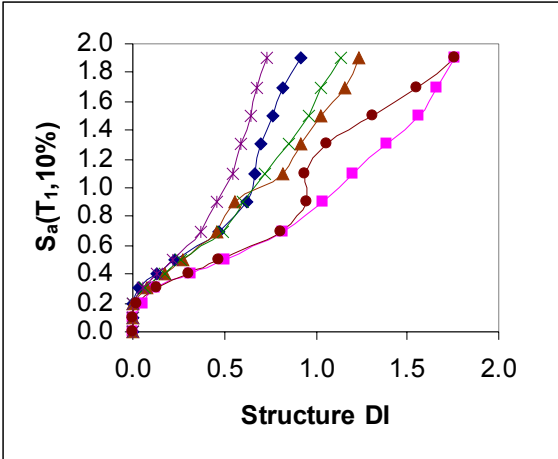


Figure B.152 (a-b): DI-IDA Curves for 10% (a) and 20% (b)  $\alpha=1.0$



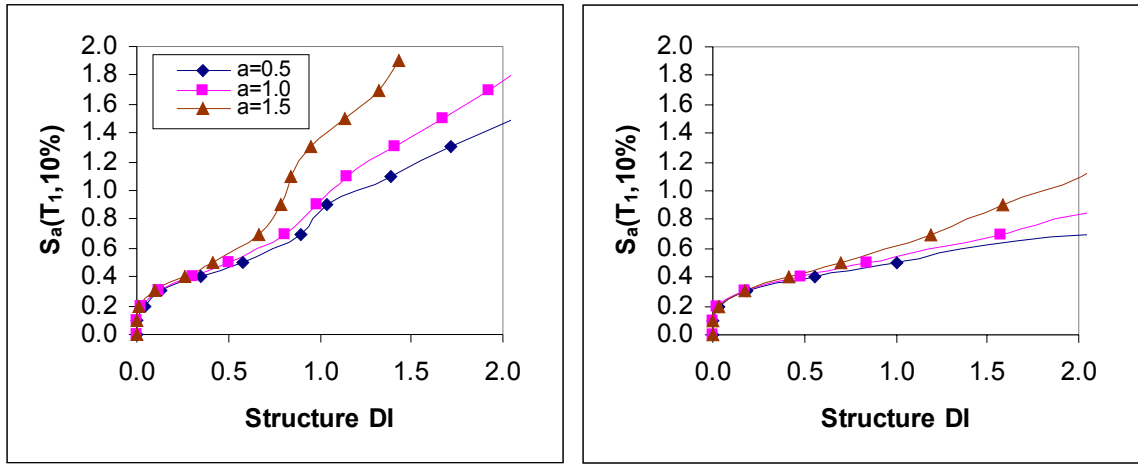
(a)



(b)

Figure B.153 (a-b): DI-IDA Curves for 10% (a) and 20% (b)  $\alpha=1.5$  at 1% Drift

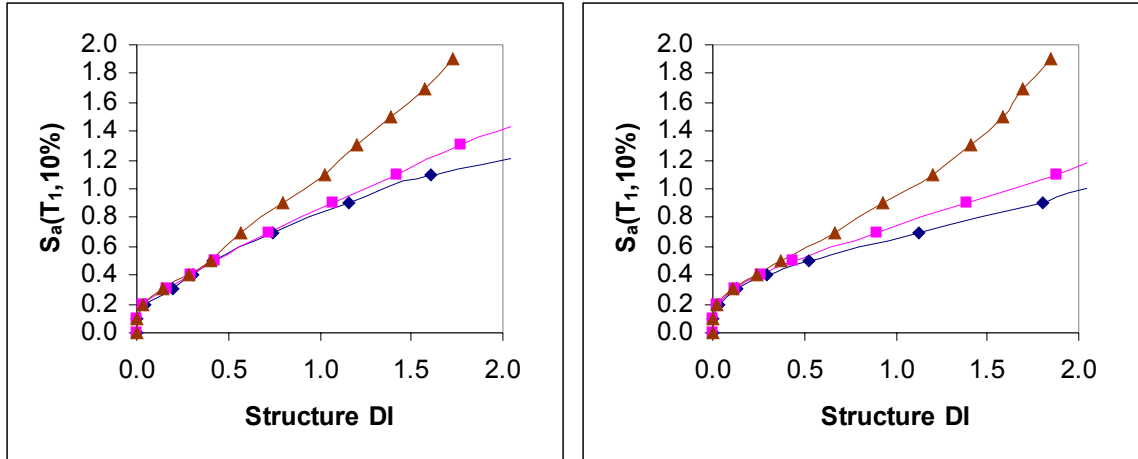
### B.12.2 Damage Index IDA Curves for Structure with Various Types of Dampers



(a)

(b)

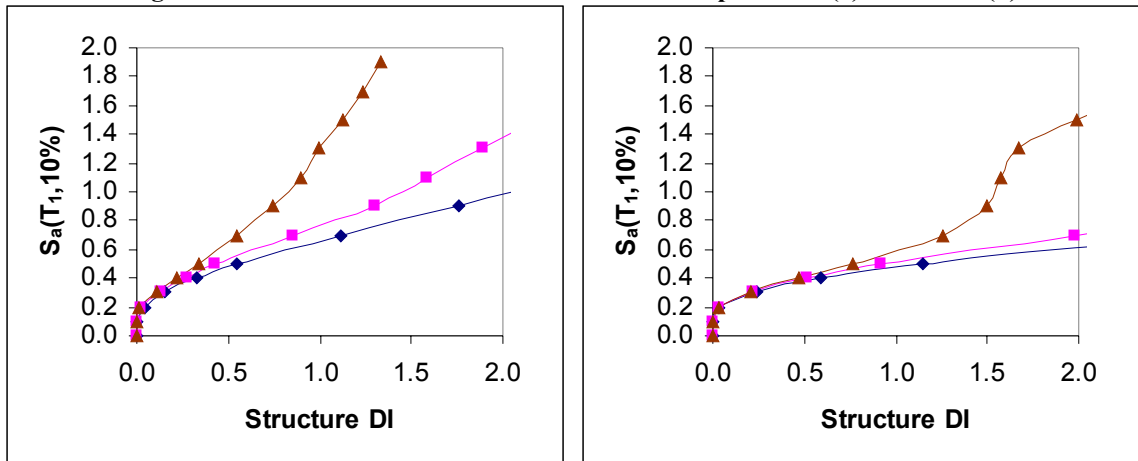
Figure B.154: DI-IDA Curve for 10% Critical Damped LA01(a) and LA10 (b)



(a)

(b)

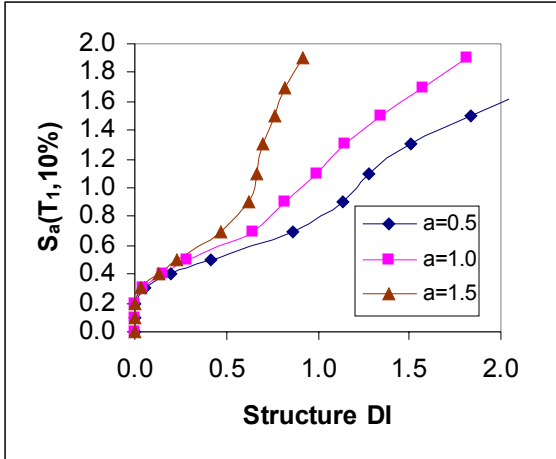
Figure B.155: DI-IDA Curve for 10% Critical Damped LA13(a) and NF01 (b)



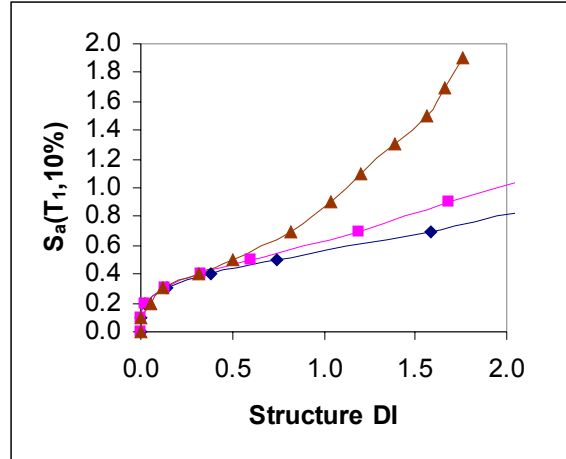
(a)

(b)

Figure B.156: DI-IDA Curve for 10% Critical Damped NF07(a) and NF13 (b)

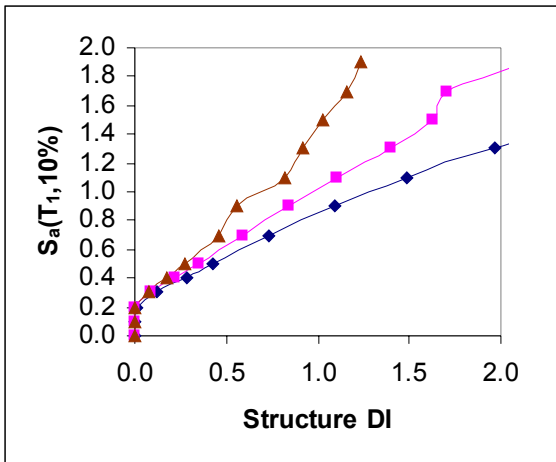


(a)

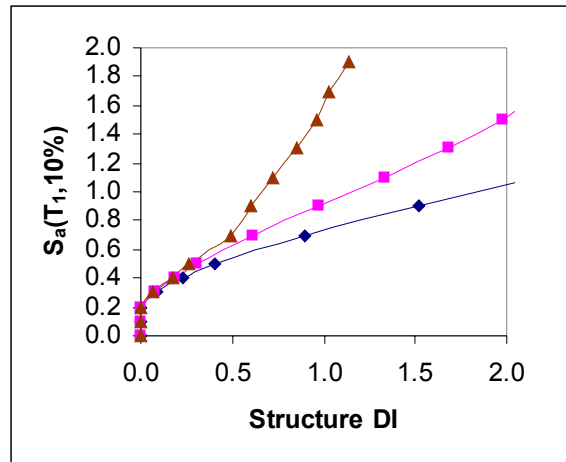


(b)

Figure B.157: DI-IDA Curve for 10% Critical Damped LA01(a) and LA10 (b)

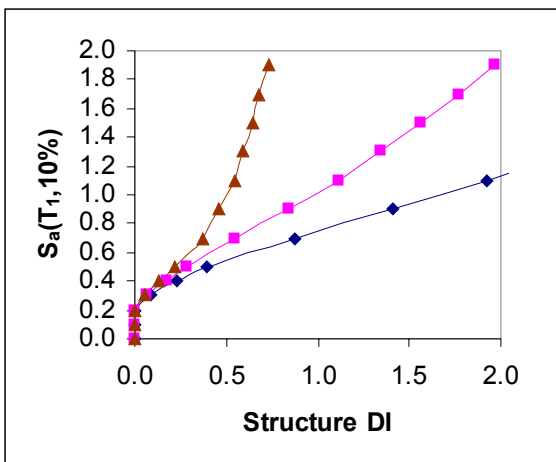


(a)

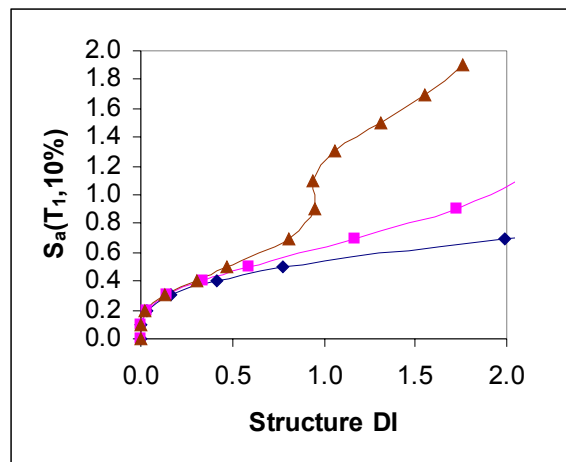


(b)

Figure B.158: DI-IDA Curve for 20% Critical Damped LA13(a) and NF01 (b)



(a)



(b)

Figure B.159: DI-IDA Curve for 20% Critical Damped NF07(a) and NF13 (b)

**Vita**  
(March 2003)

Michael G. Oesterle was born on January 20, 1979 in Hinsdale, Illinois. After completing high school in Villa Park, Illinois in June of 1997, Michael attended the University of Notre Dame where he graduated with a Bachelor of Science degree in Civil Engineering in May of 2001. In August of 2001 he arrived at Virginia Polytechnic Institute and State University to pursue a Master of Science degree in Civil Engineering. After graduating in the spring of 2003 Michael plans to marry Wainani Au on August 16, 2003 and begin studies for PhD in structural engineering at the University of California, San Diego for the following fall.