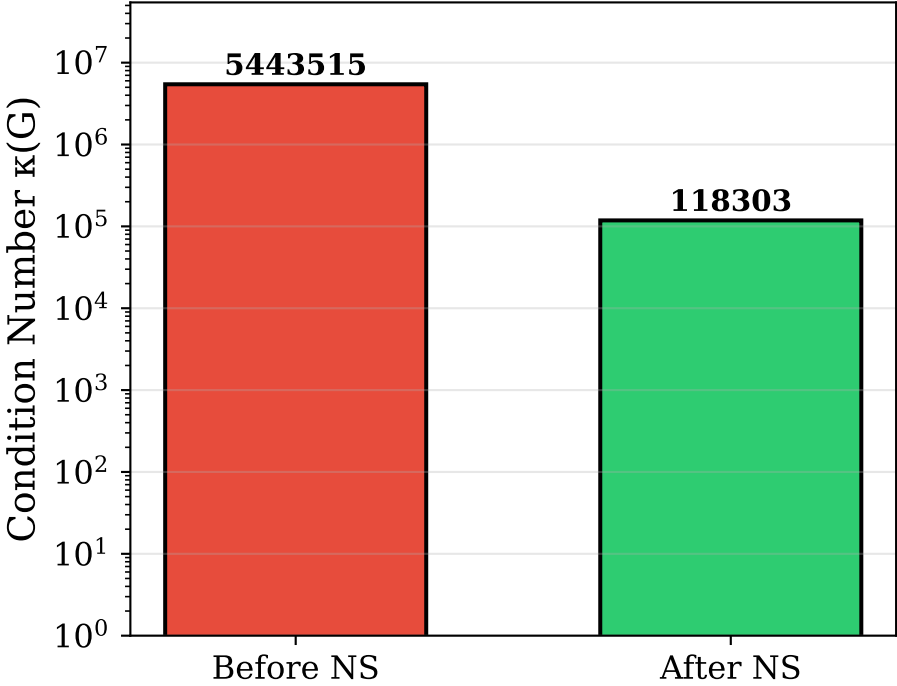
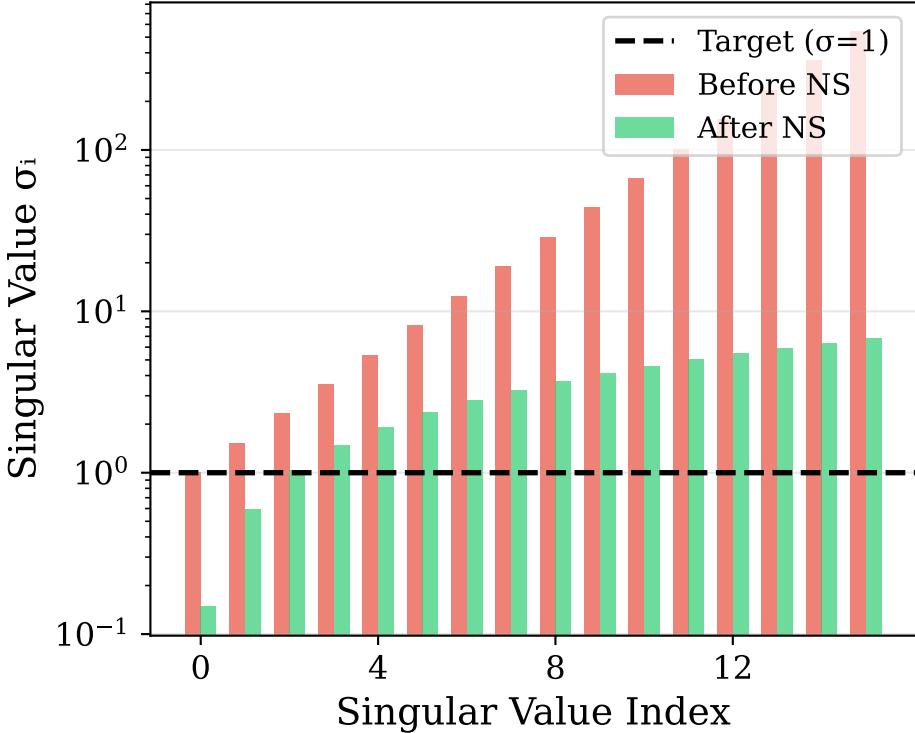


Newton-Schulz Orthogonalization Effect on HAR Training

(a) Condition Number Reduction
(46.0× improvement)



(b) Singular Value Spectrum



(c) Summary of NS Benefits

Metric	Before NS	After NS	Improvement
Condition Number κ	~5M	~118K	46×
Numerical Stability	Poor	Good	☑
Gradient Flow	Unstable	Stable	☑