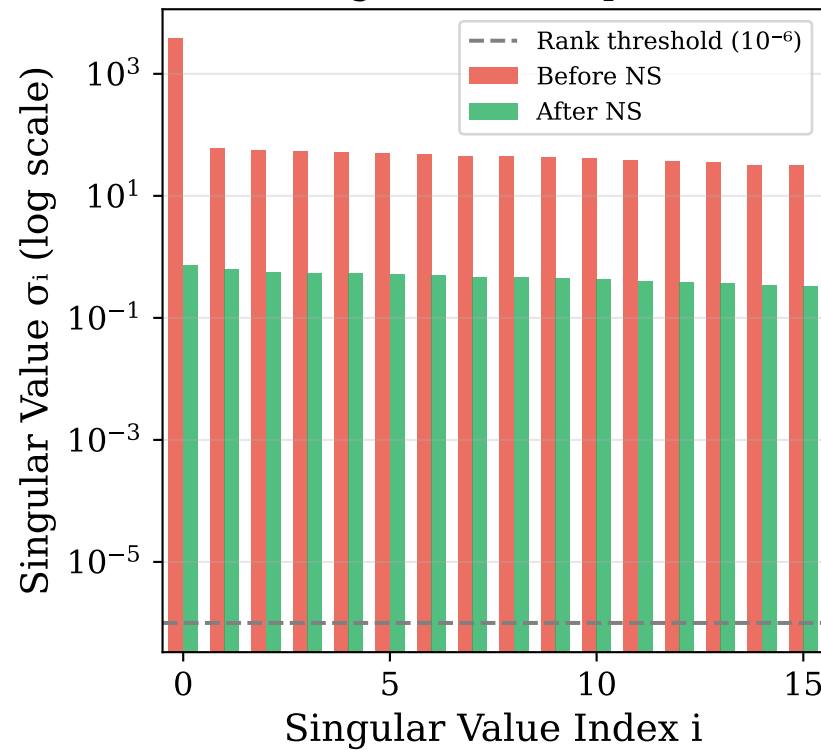
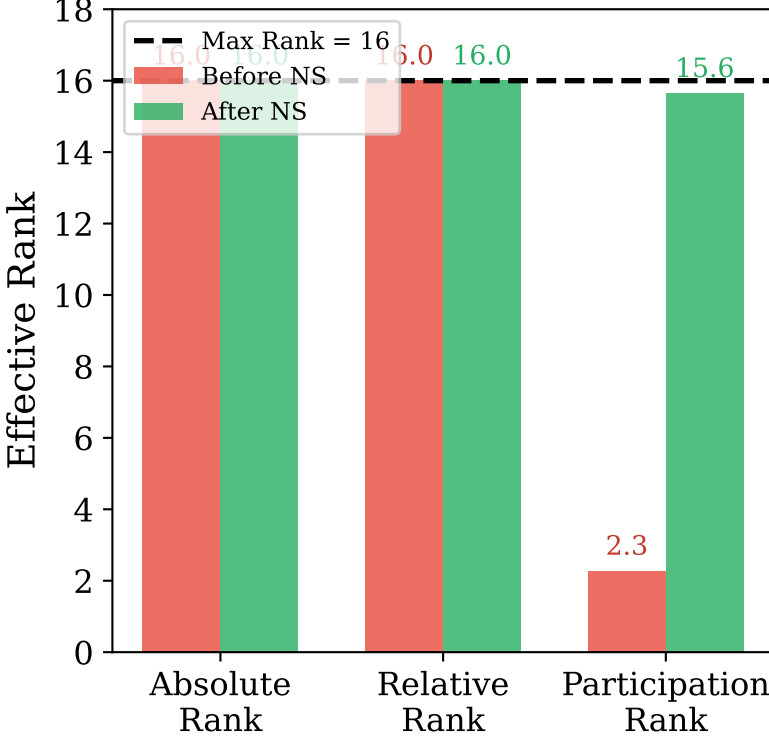


Newton-Schulz Transforms Near Rank-Deficient Matrix to Full-Rank

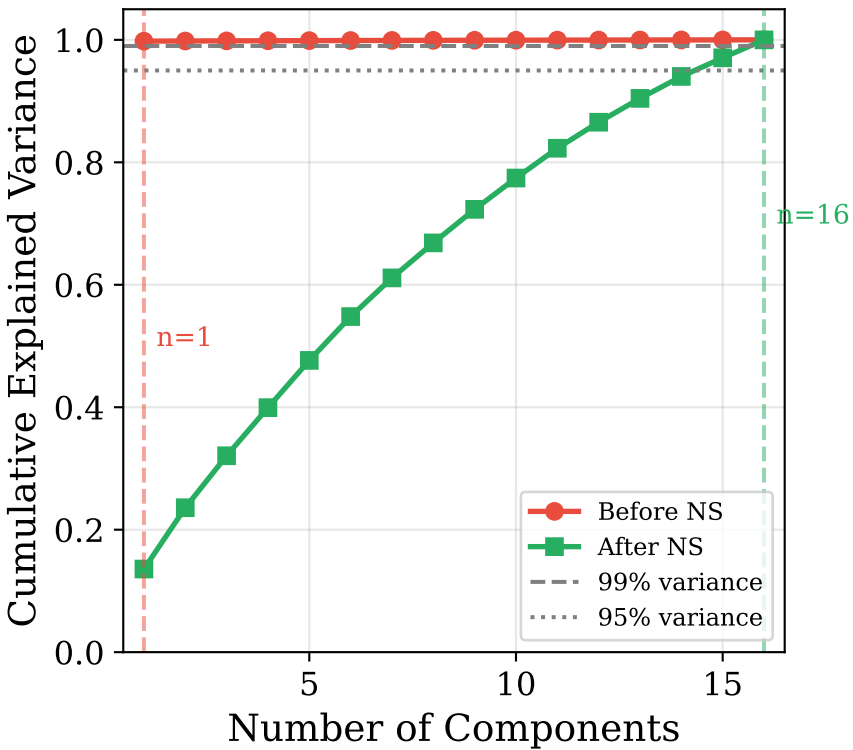
(a) Singular Value Spectrum



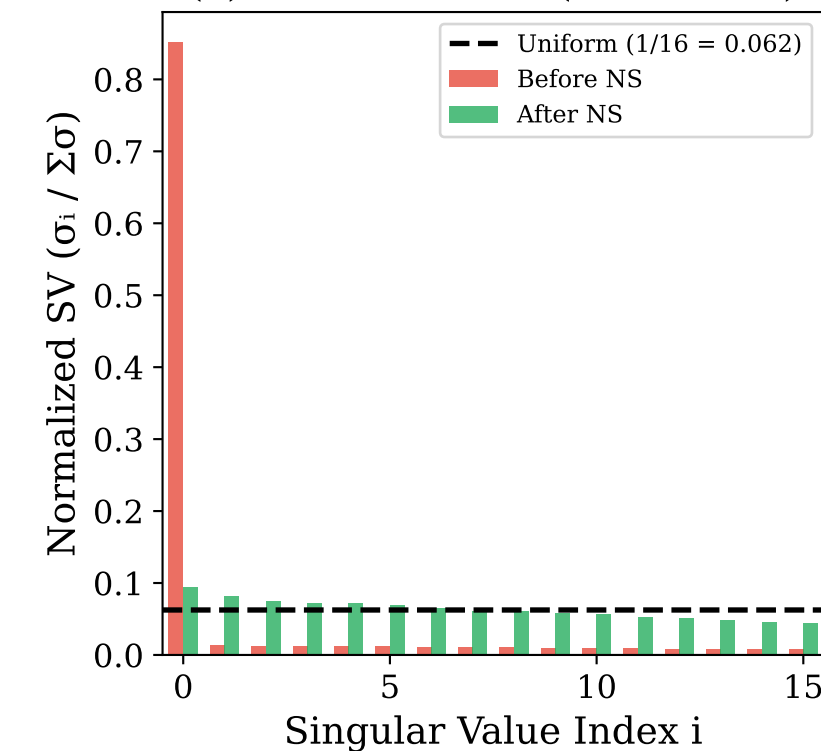
(b) Effective Rank Metrics



(c) Variance Concentration



(d) SV Distribution (normalized)



(e) Summary

RANK ANALYSIS SUMMARY

Matrix shape: $[128 \times 16]$
Maximum possible rank: 16

BEFORE Newton-Schulz:

Effective rank: 16 / 16
Participation rank: 2.3
Condition number: 1.20×10^2
Components for 99%: 1

AFTER Newton-Schulz:

Effective rank: 16 / 16
Participation rank: 15.6
Condition number: 2.15×10^0
Components for 99%: 16

IMPROVEMENT:

Rank: 16 \rightarrow 16 (1.0 \times)
Condition: 55.9 \times reduction

(f) Active Dimensions (Green=Active, Red=Inactive)

