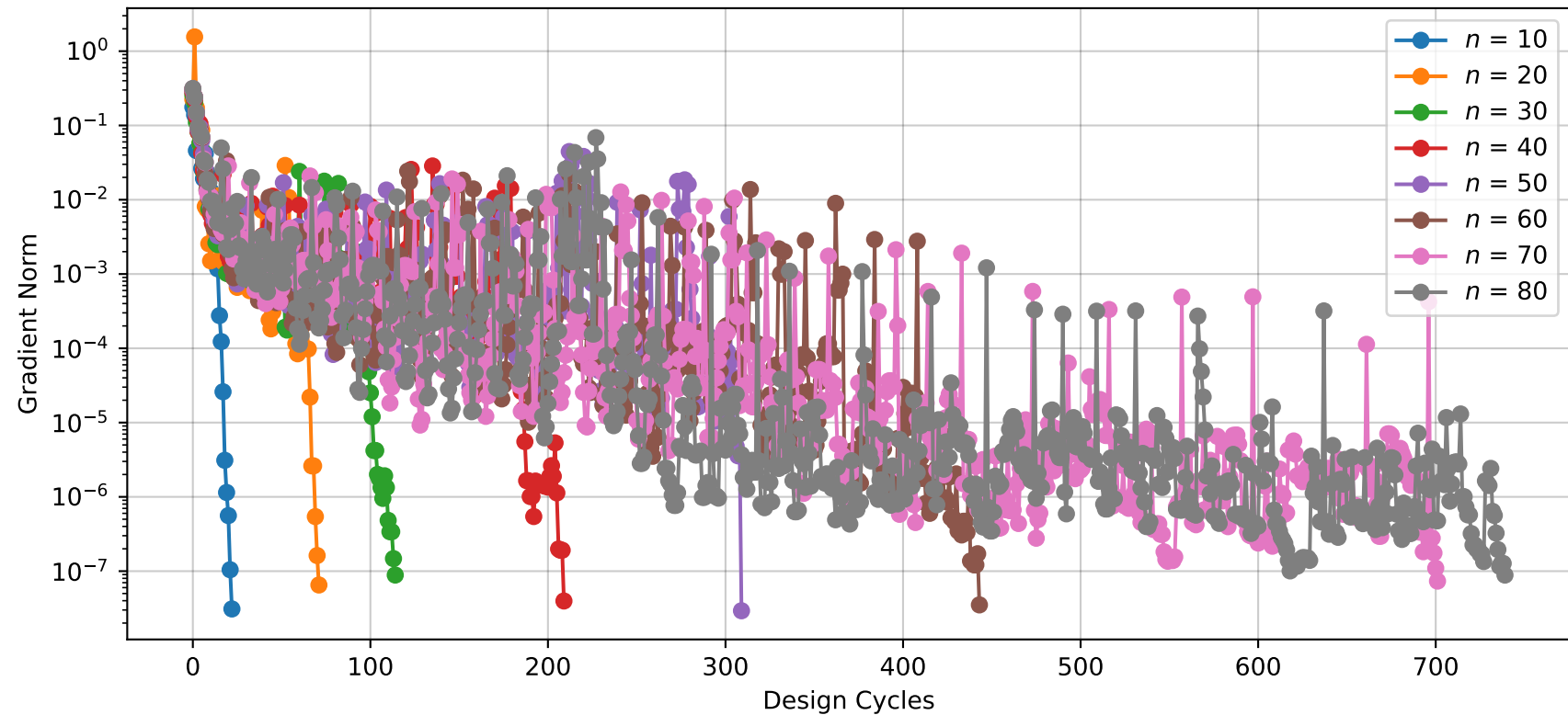
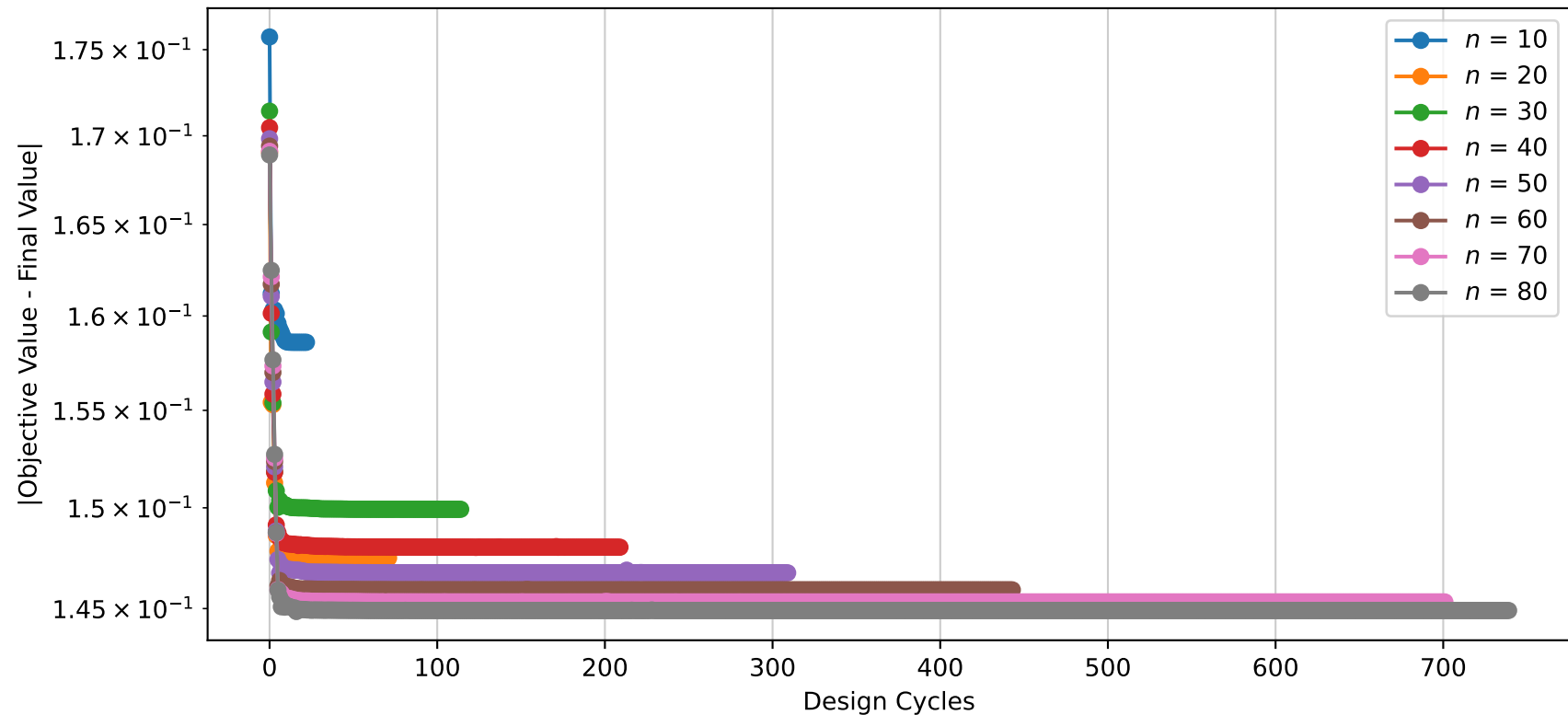


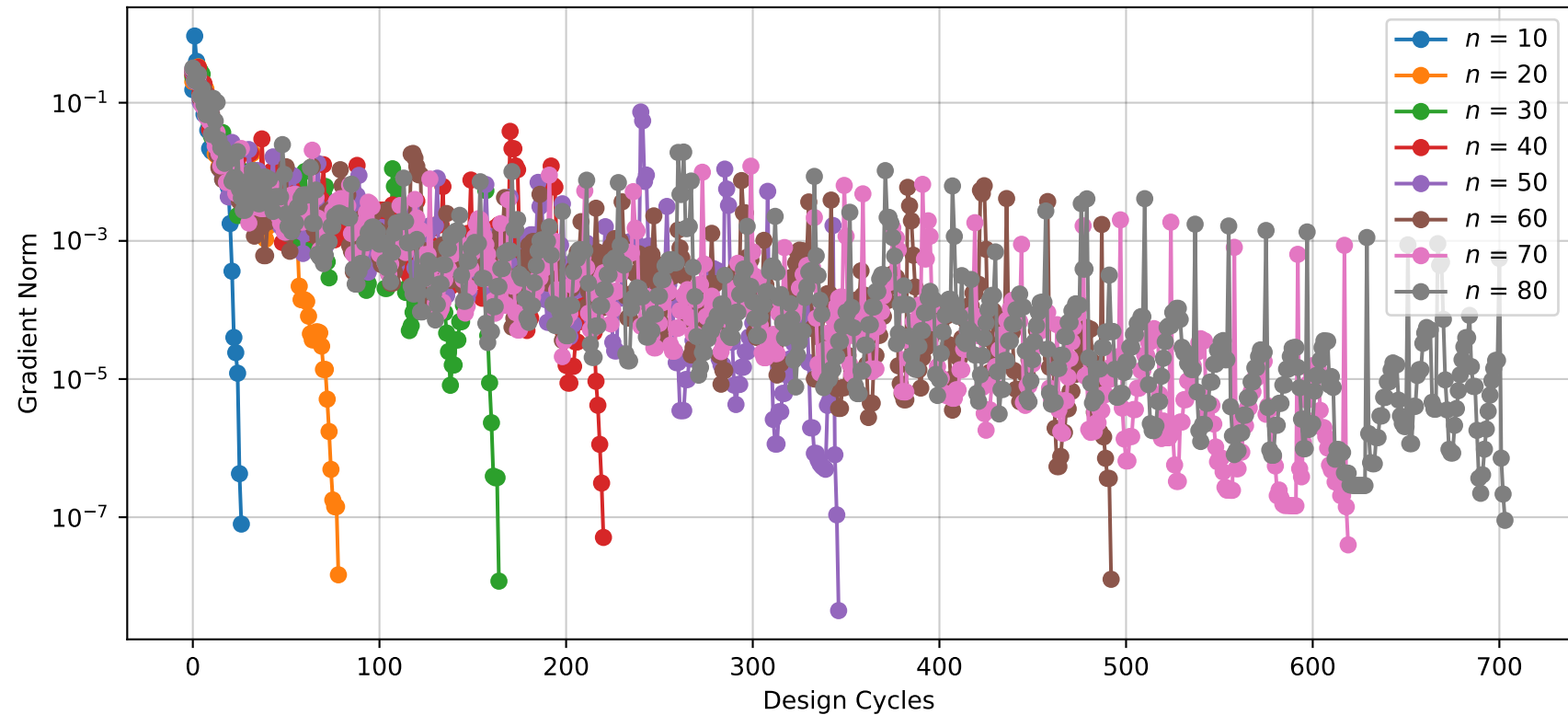
Reduced-space BFGS Gradient vs Design Cycles,  $m = 2592$



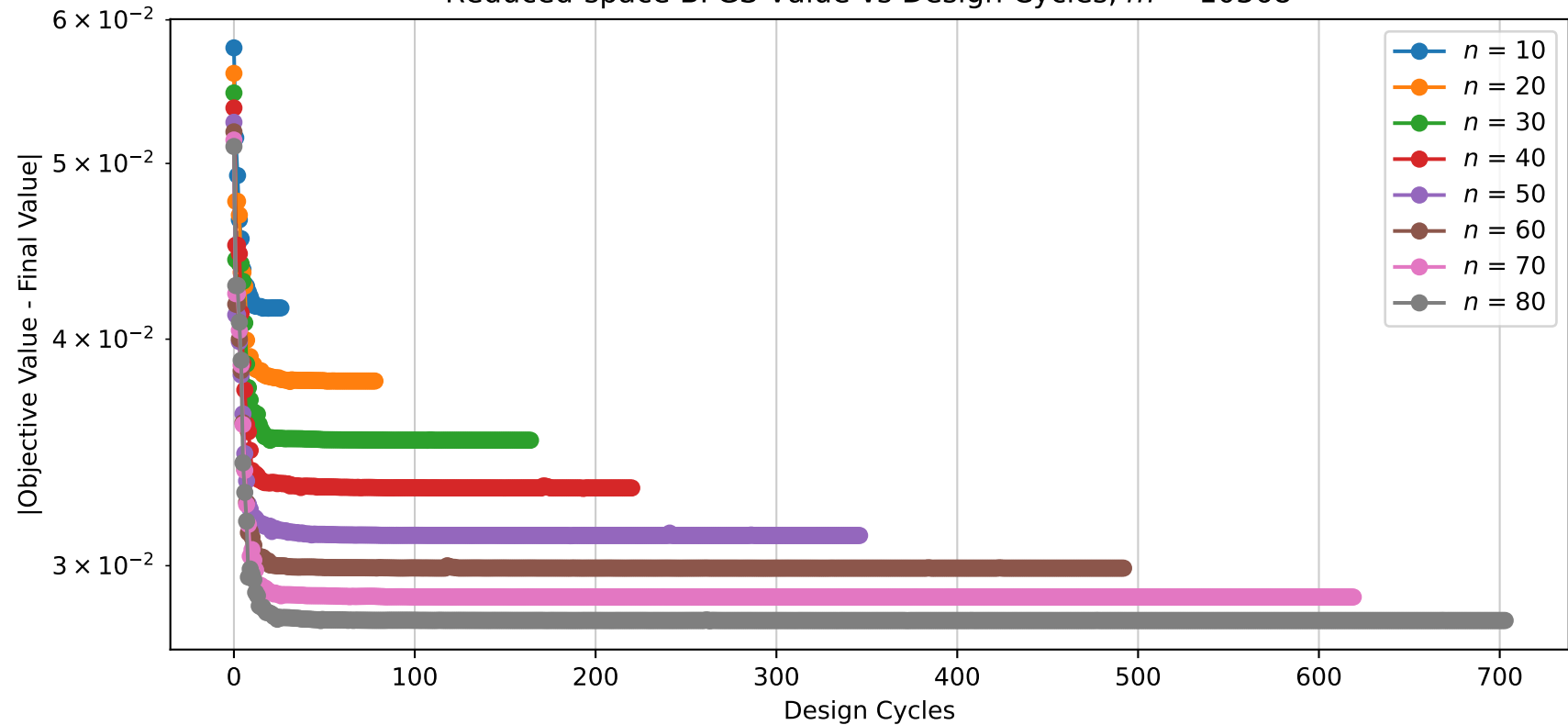
Reduced-space BFGS Value vs Design Cycles,  $m = 2592$



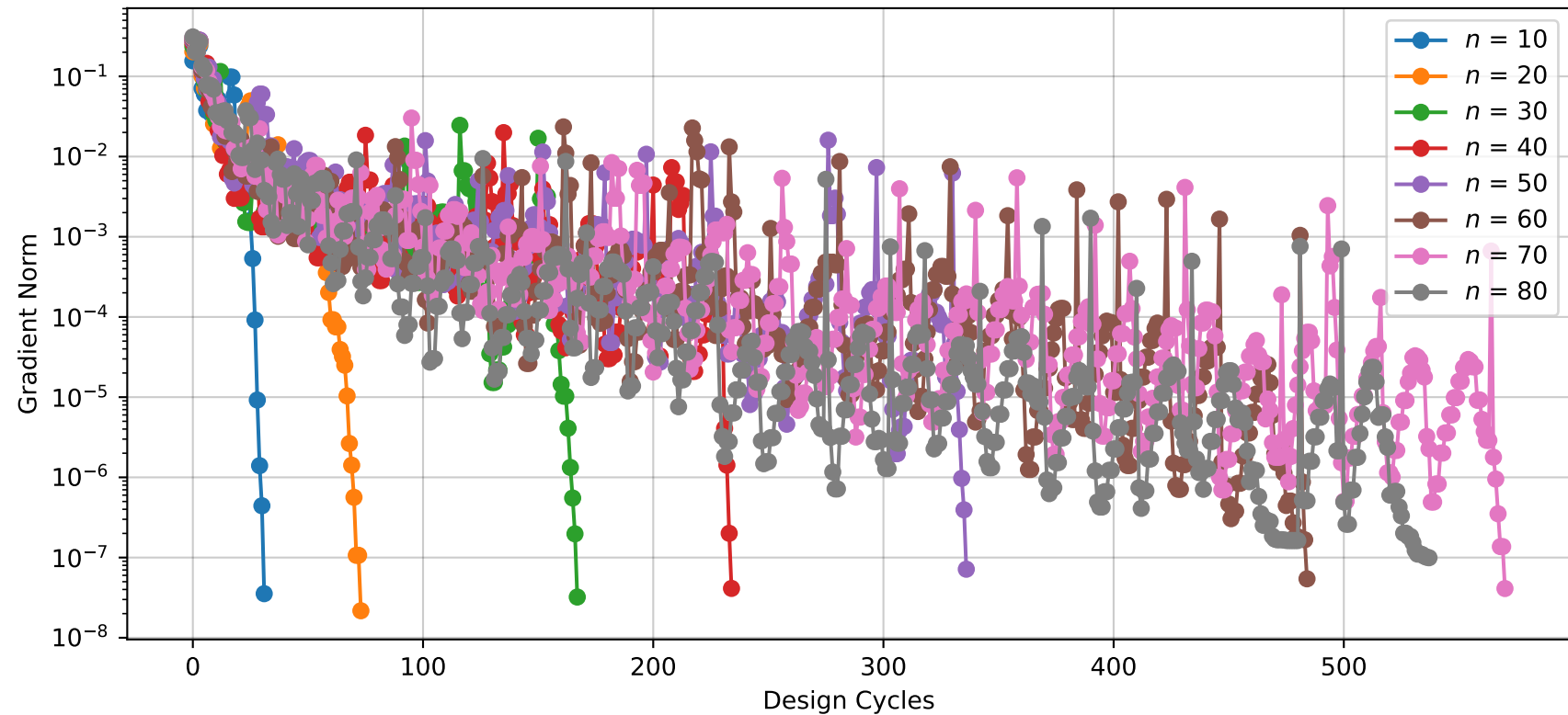
Reduced-space BFGS Gradient vs Design Cycles,  $m = 10368$



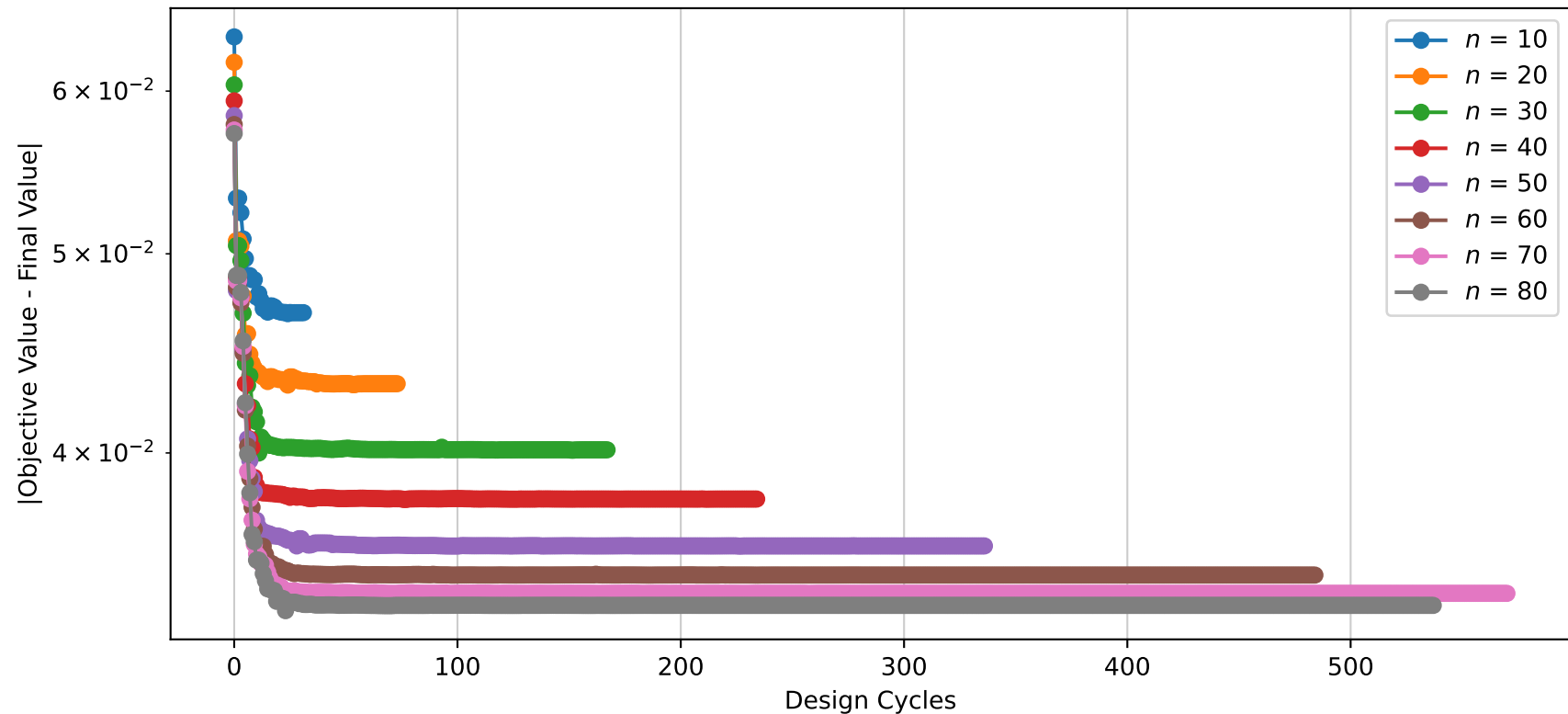
Reduced-space BFGS Value vs Design Cycles,  $m = 10368$



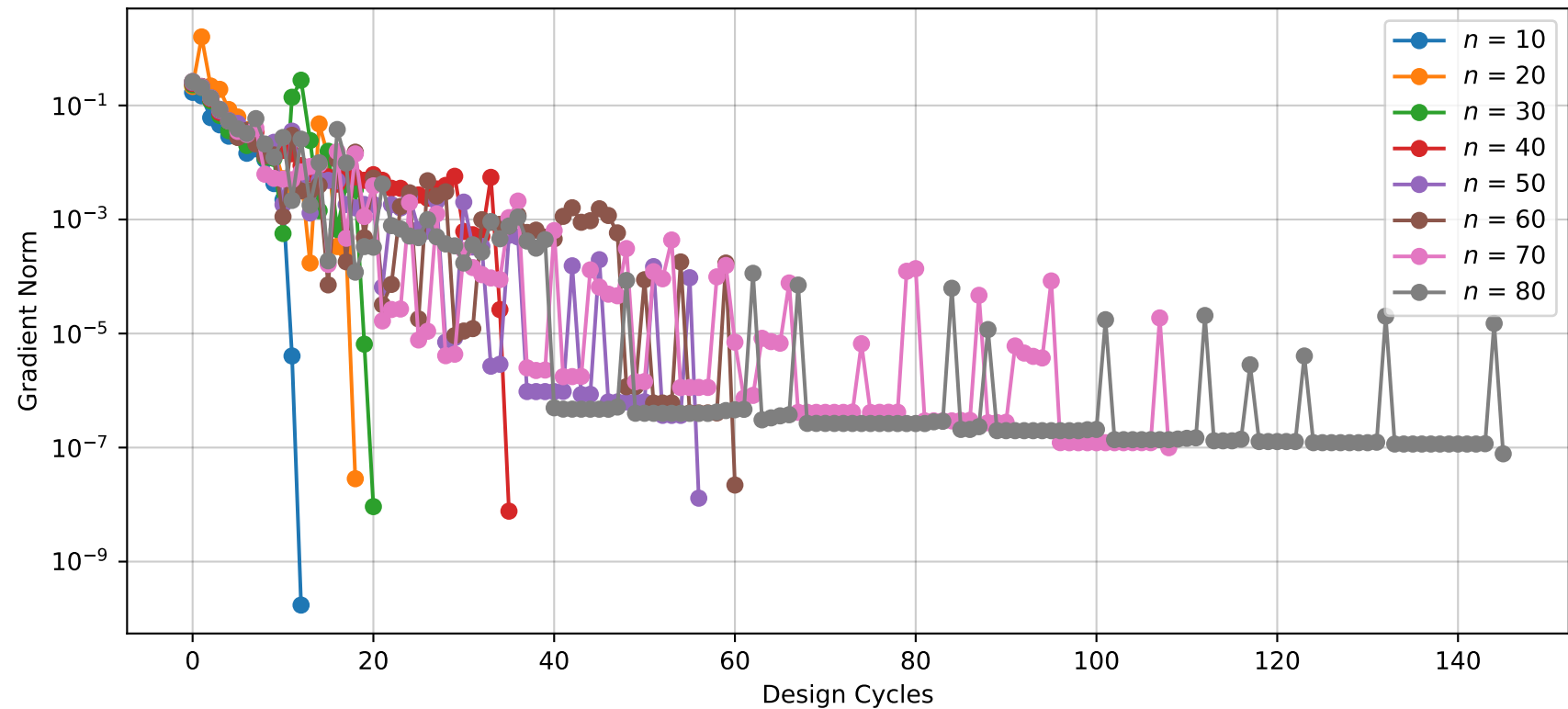
Reduced-space BFGS Gradient vs Design Cycles,  $m = 23328$



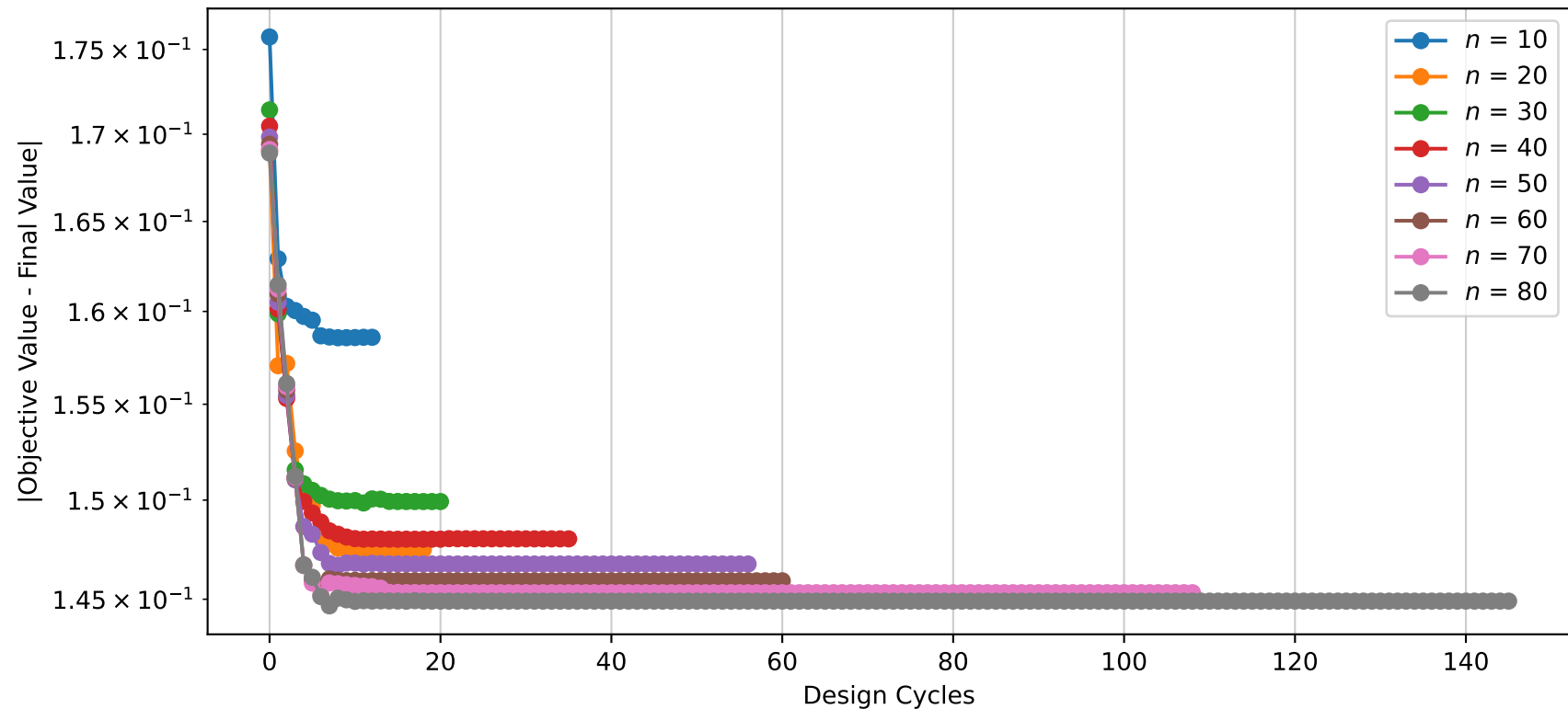
Reduced-space BFGS Value vs Design Cycles,  $m = 23328$



Full-space with  $\tilde{\mathbf{P}}_2$  Gradient vs Design Cycles,  $m = 2592$

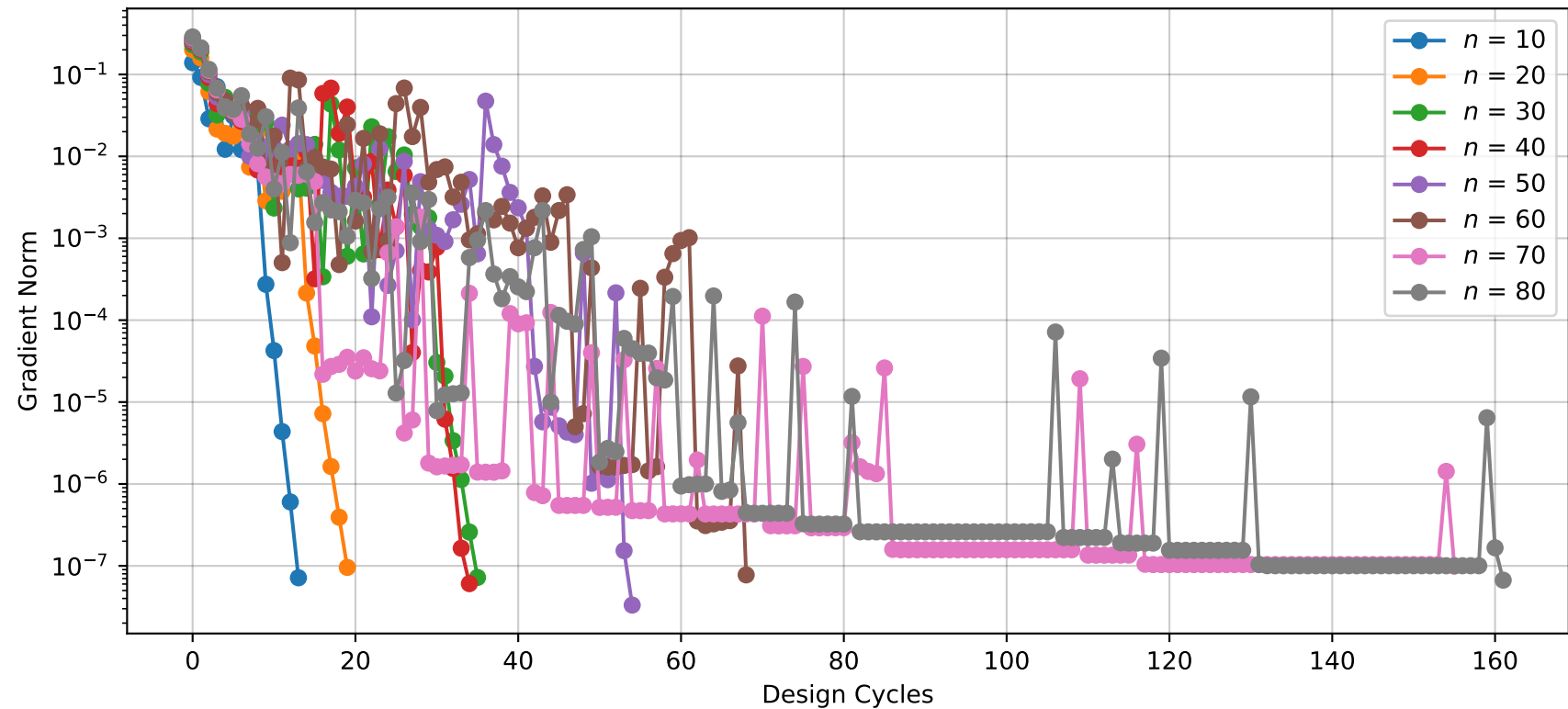


Full-space with  $\tilde{\mathbf{P}}_2$  Value vs Design Cycles,  $m = 2592$

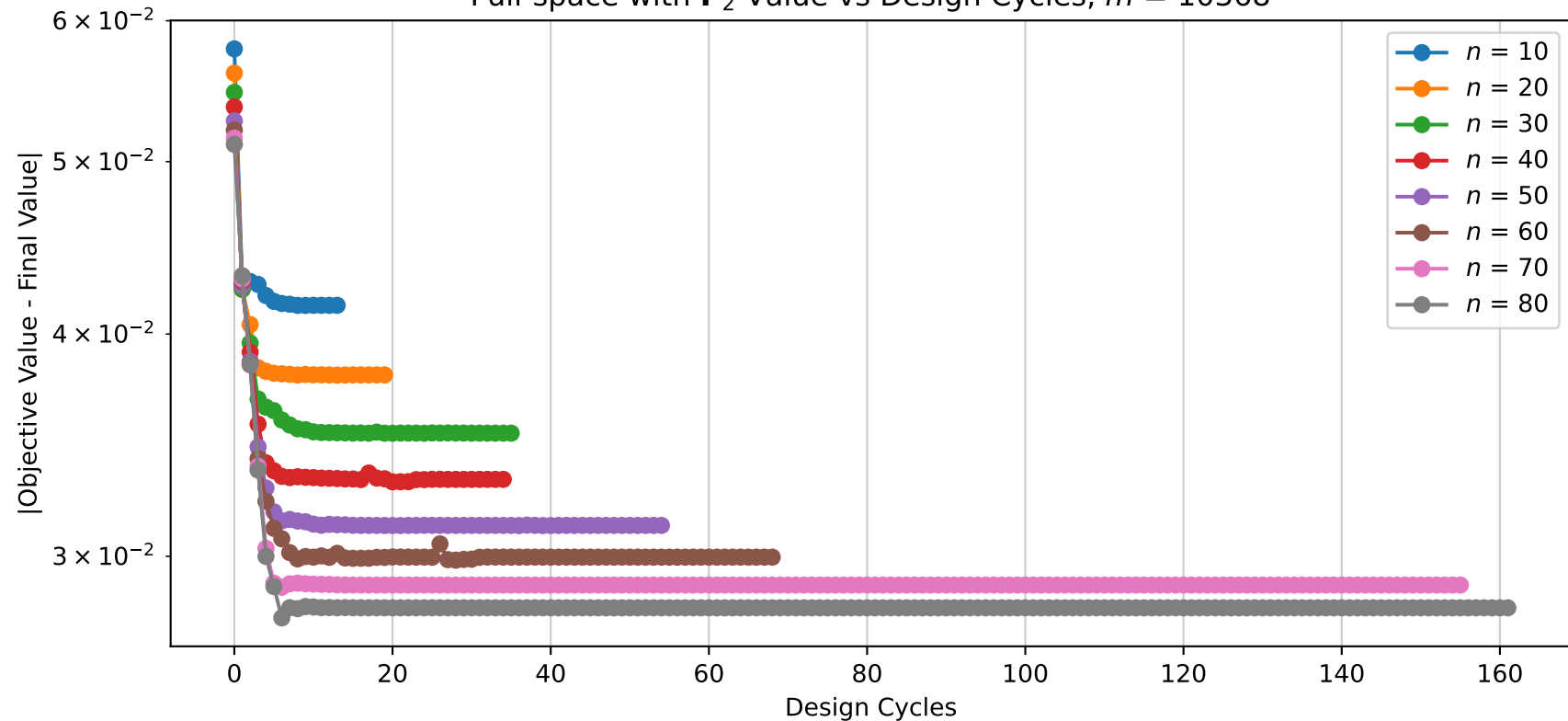




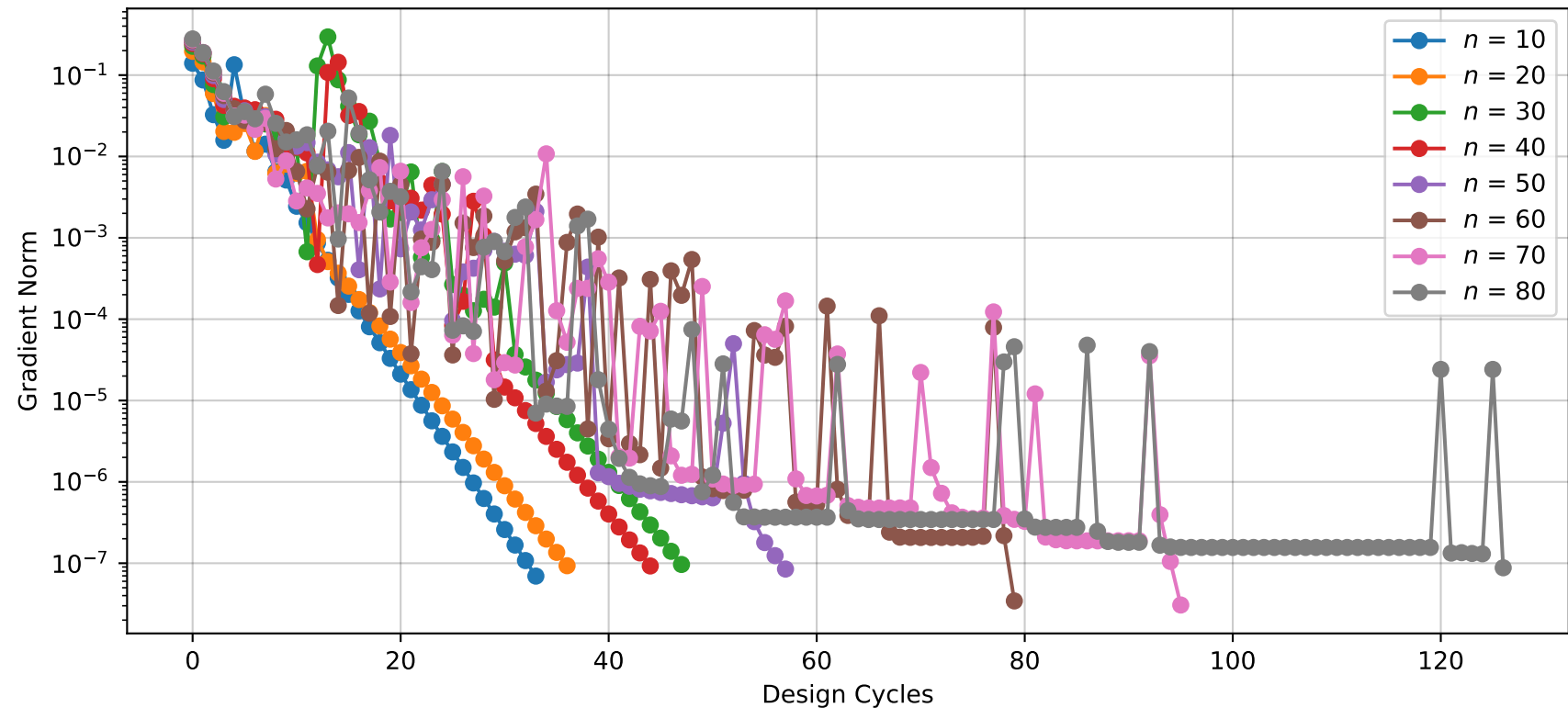
Full-space with  $\tilde{\mathbf{P}}_2$  Gradient vs Design Cycles,  $m = 10368$



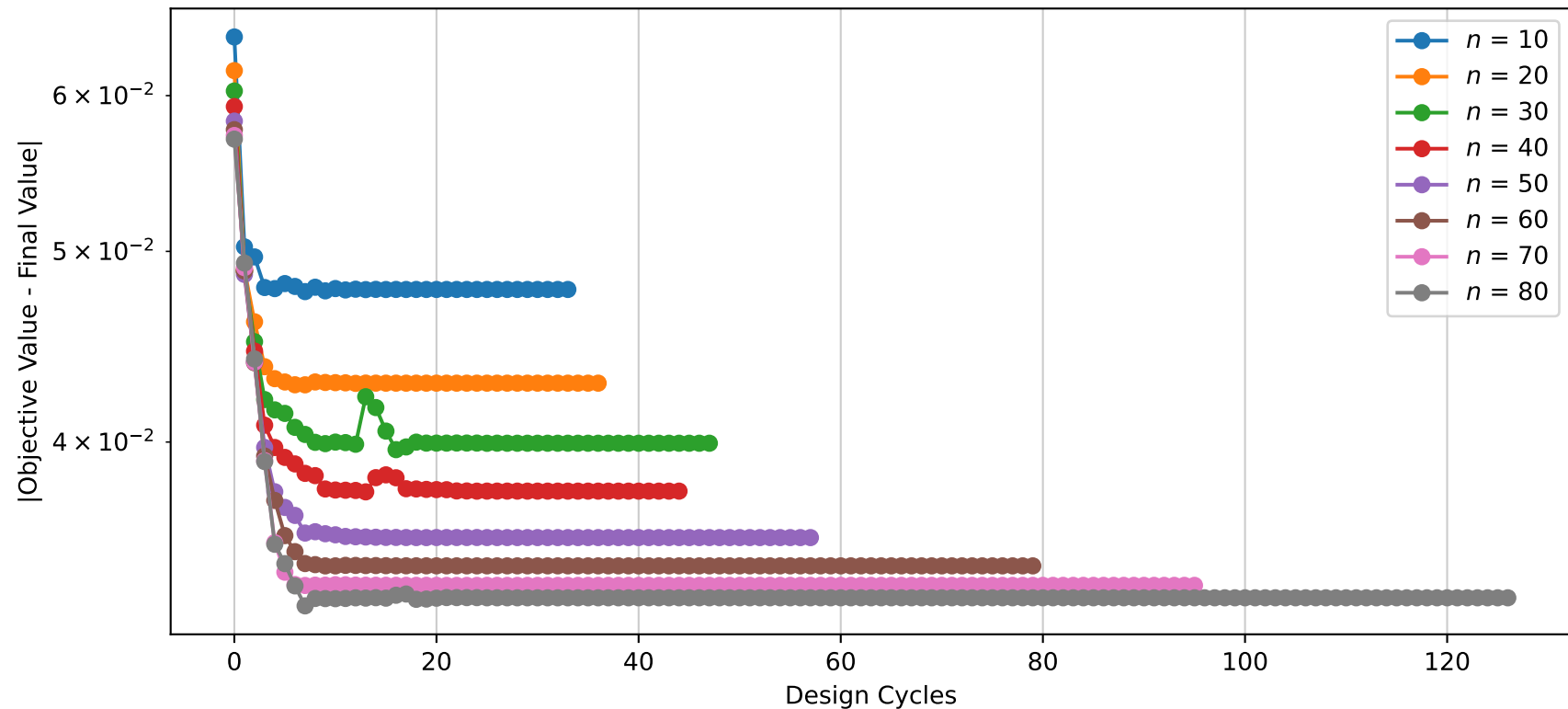
Full-space with  $\tilde{\mathbf{P}}_2$  Value vs Design Cycles,  $m = 10368$

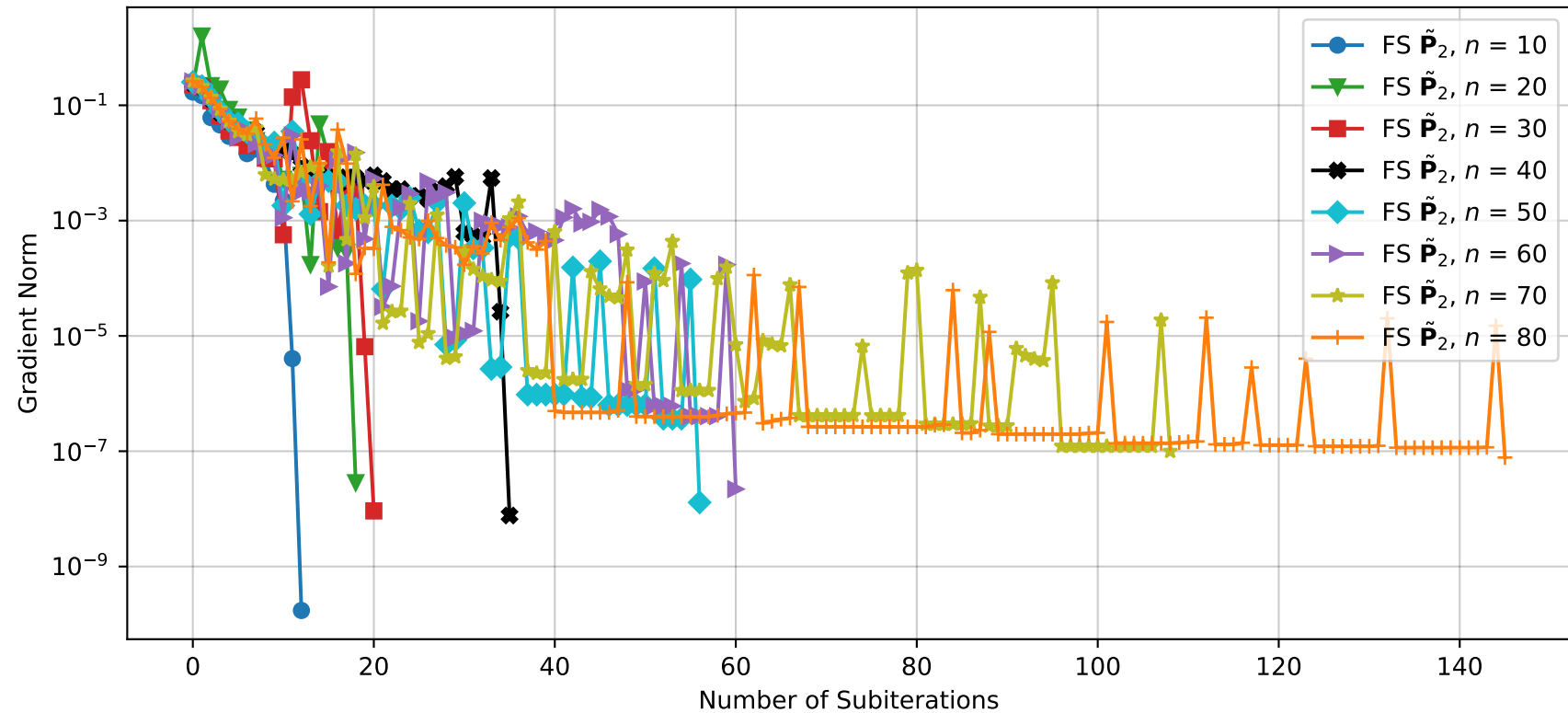


Full-space with  $\tilde{\mathbf{P}}_2$  Gradient vs Design Cycles,  $m = 23328$

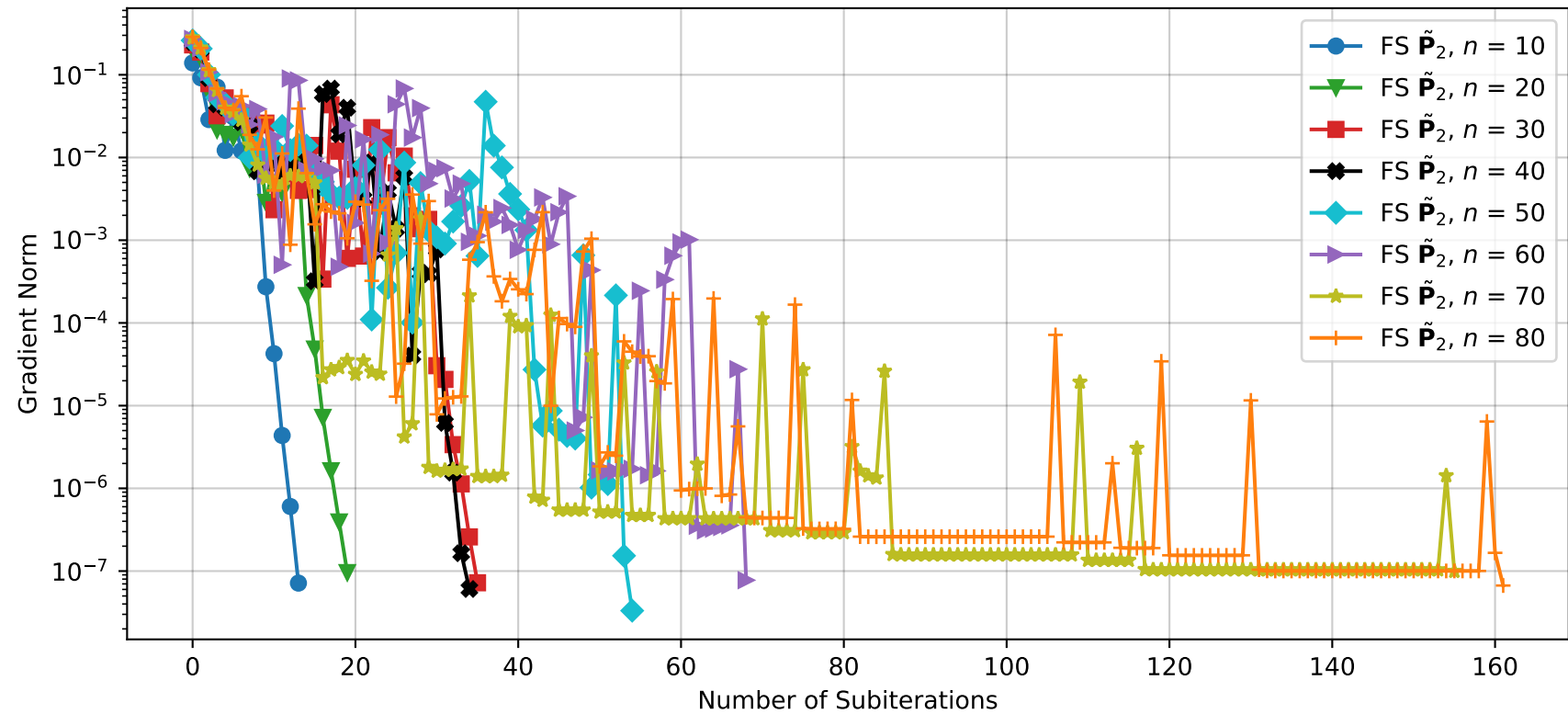


Full-space with  $\tilde{\mathbf{P}}_2$  Value vs Design Cycles,  $m = 23328$

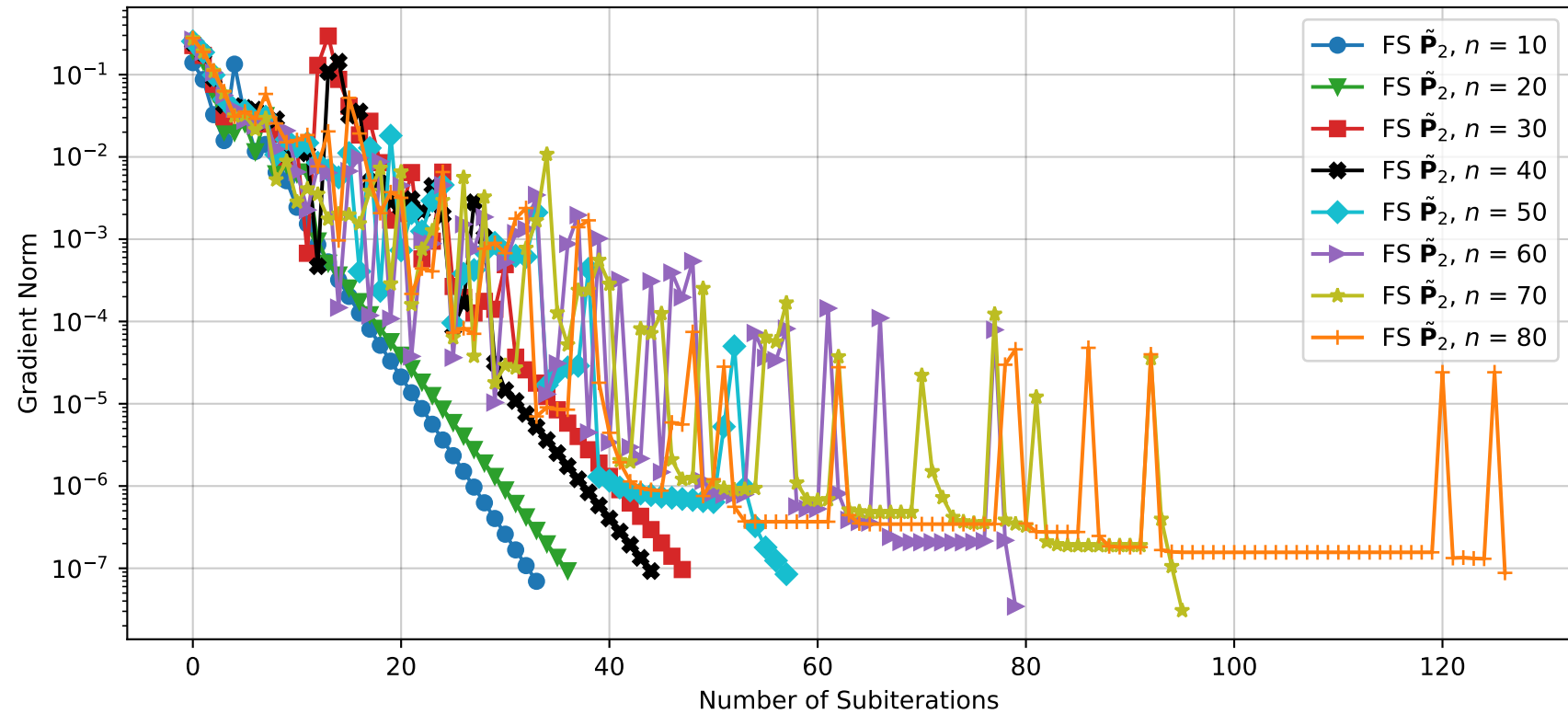


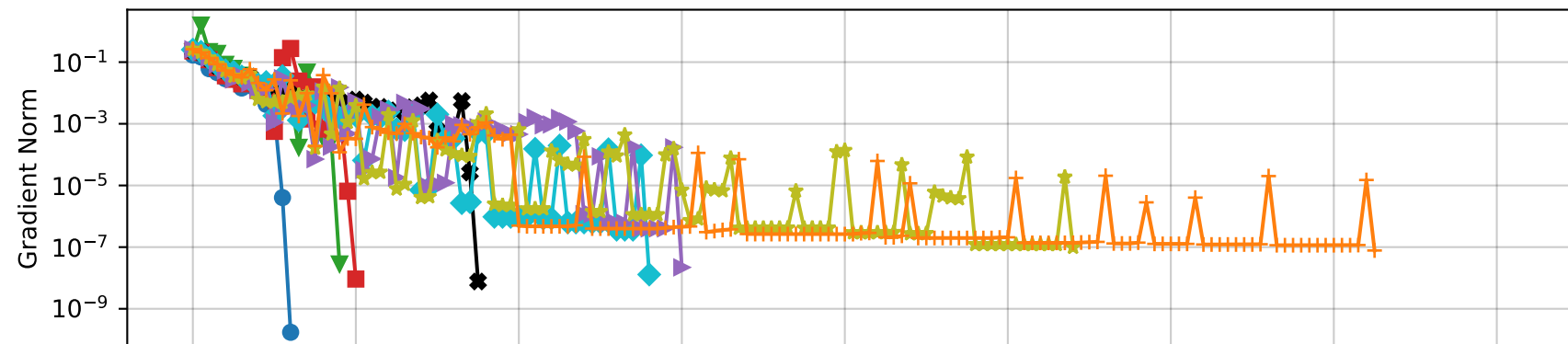
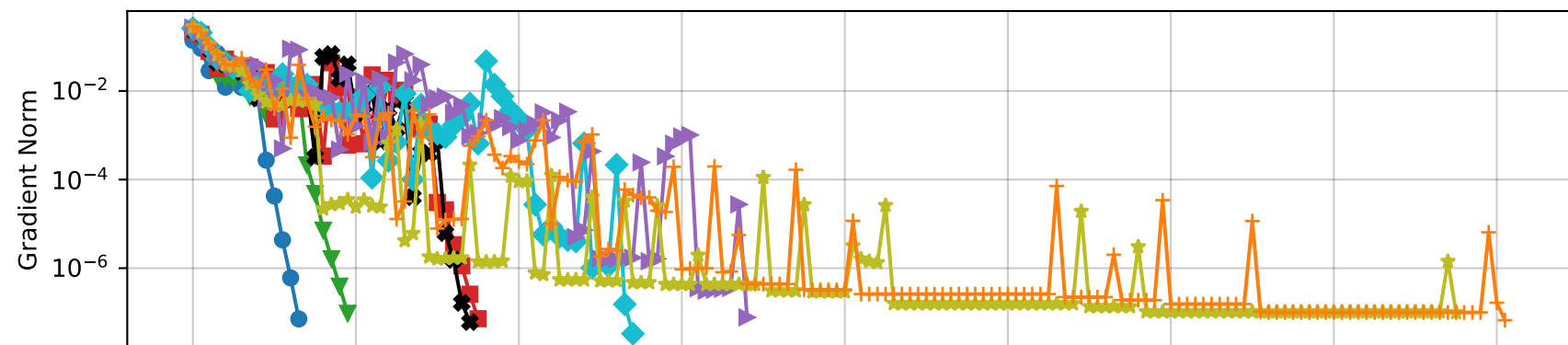
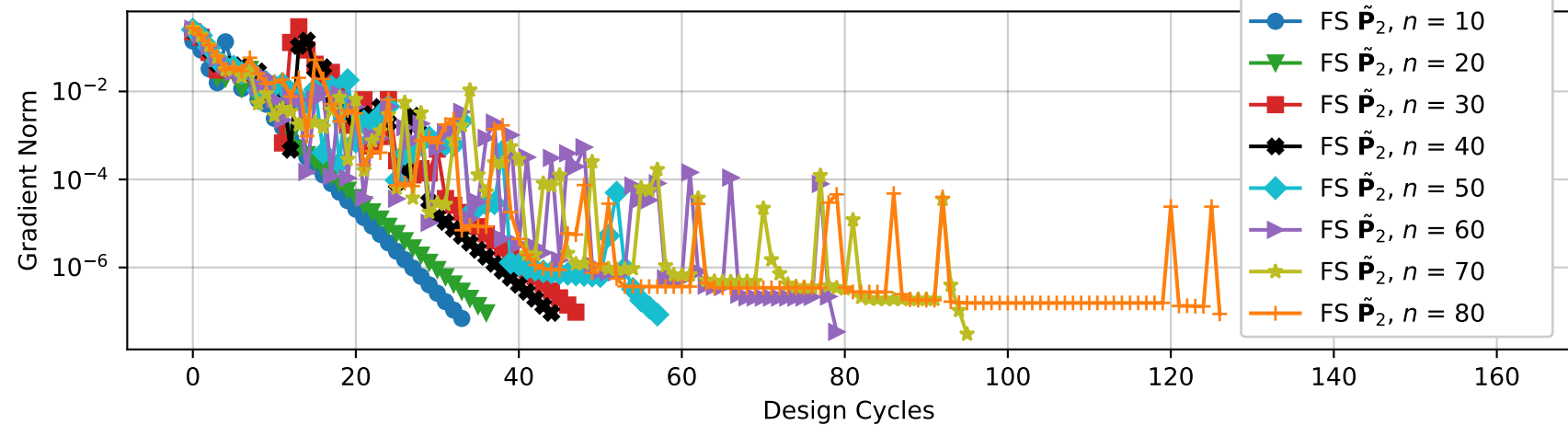
Full-space Gradient vs Design Cyles,  $m = 2592$ 

Full-space Gradient vs Design Cycles,  $m = 10368$



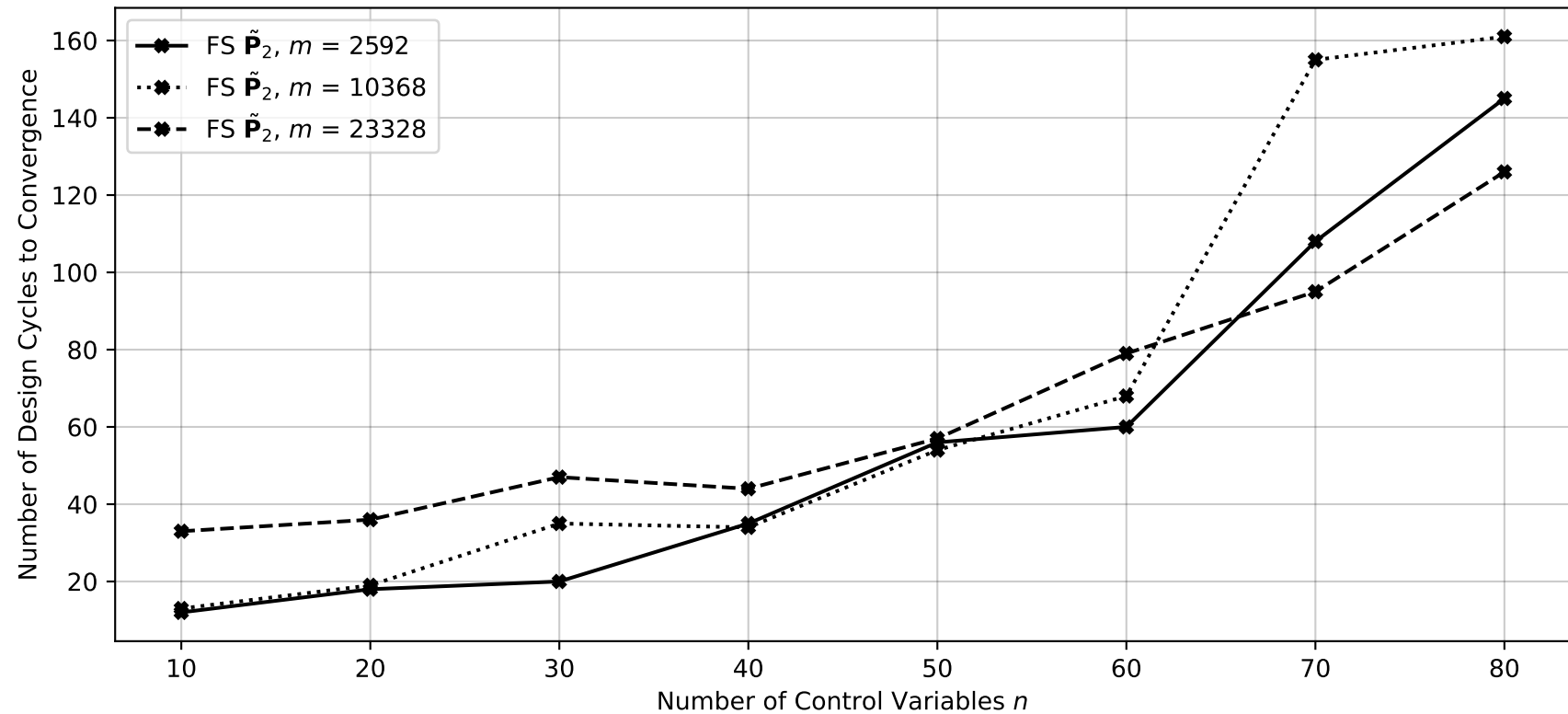
Full-space Gradient vs Design Cycles,  $m = 23328$



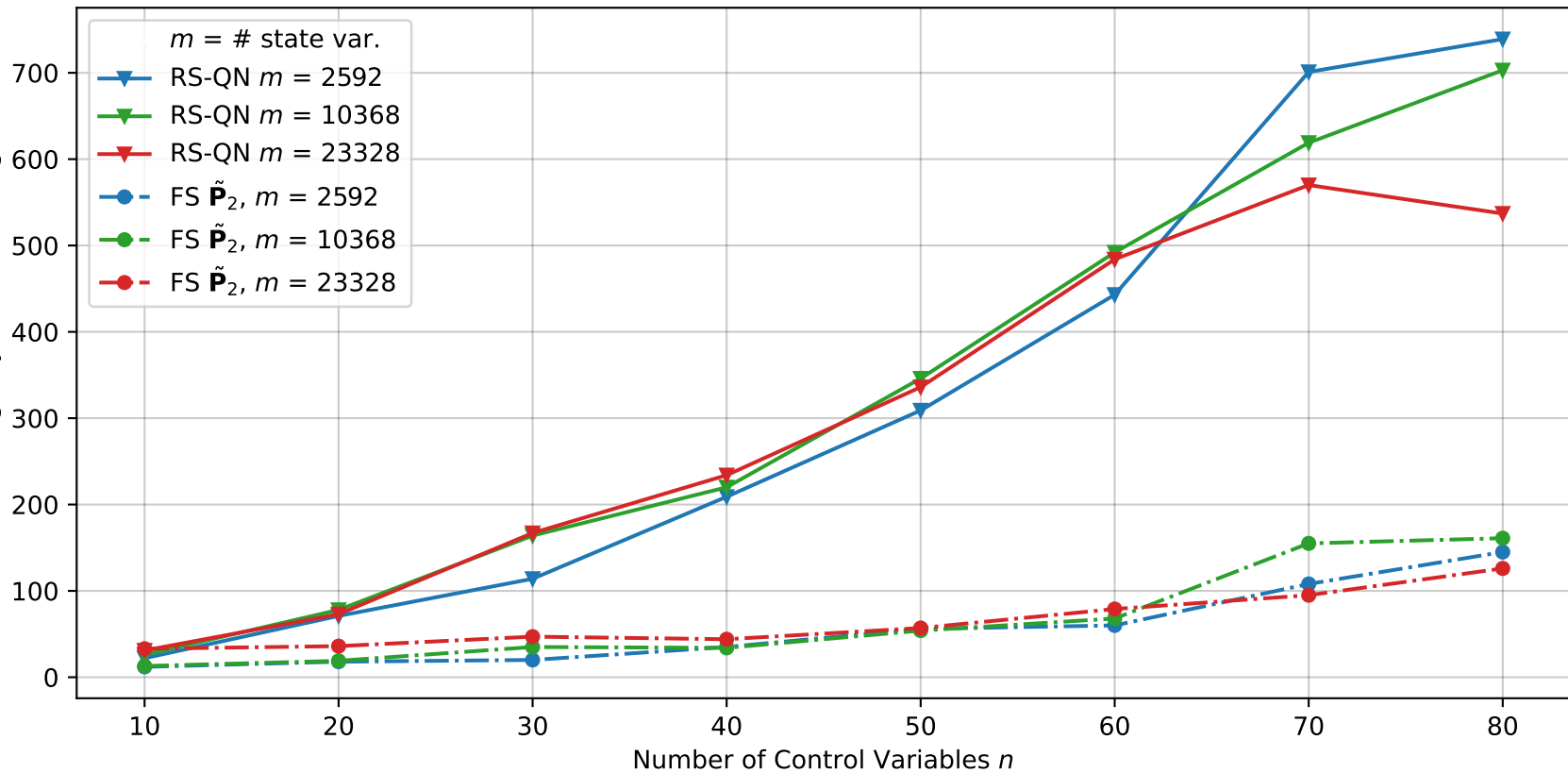
State Variables,  $m = 2592$ State Variables,  $m = 10368$ State Variables,  $m = 23328$ 



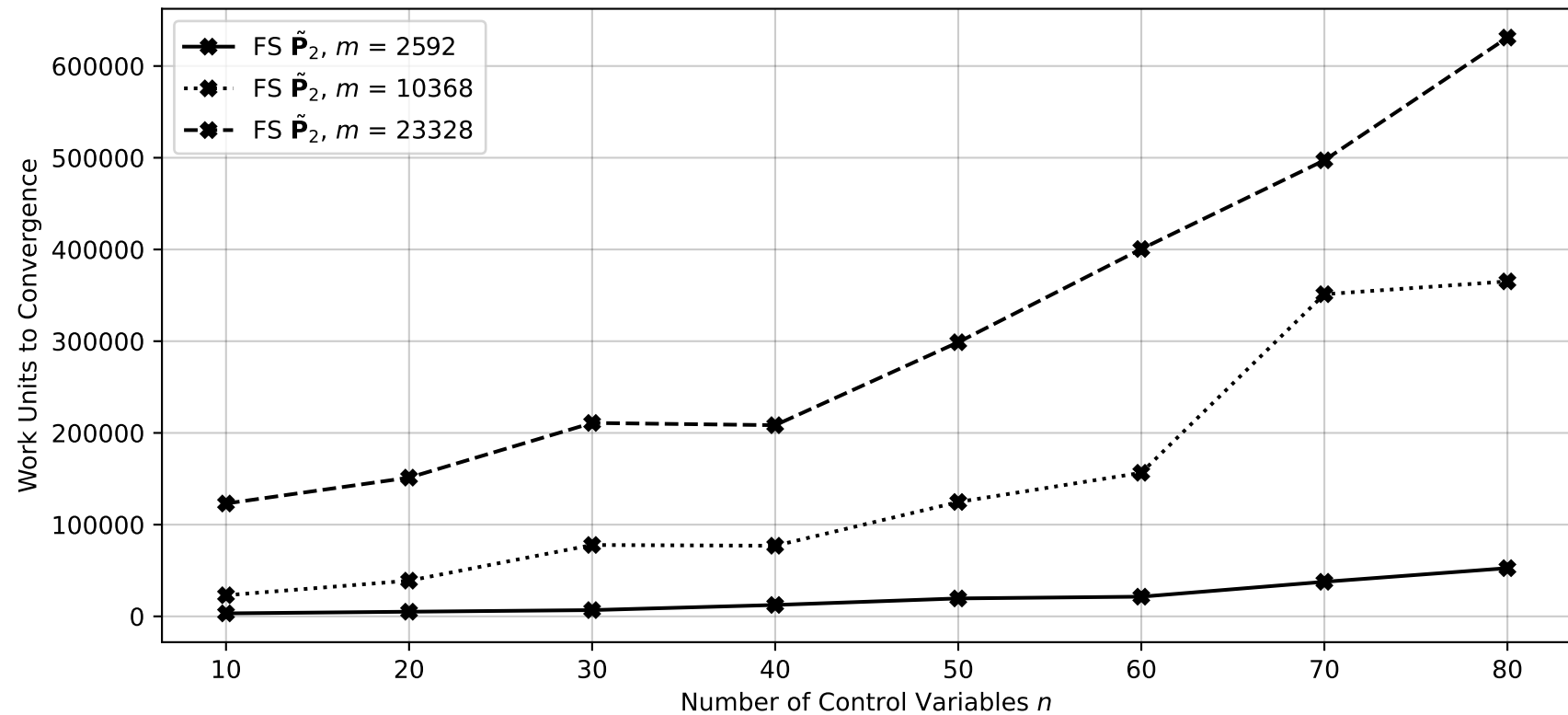
# Full-space Design Cycles vs Control Variables



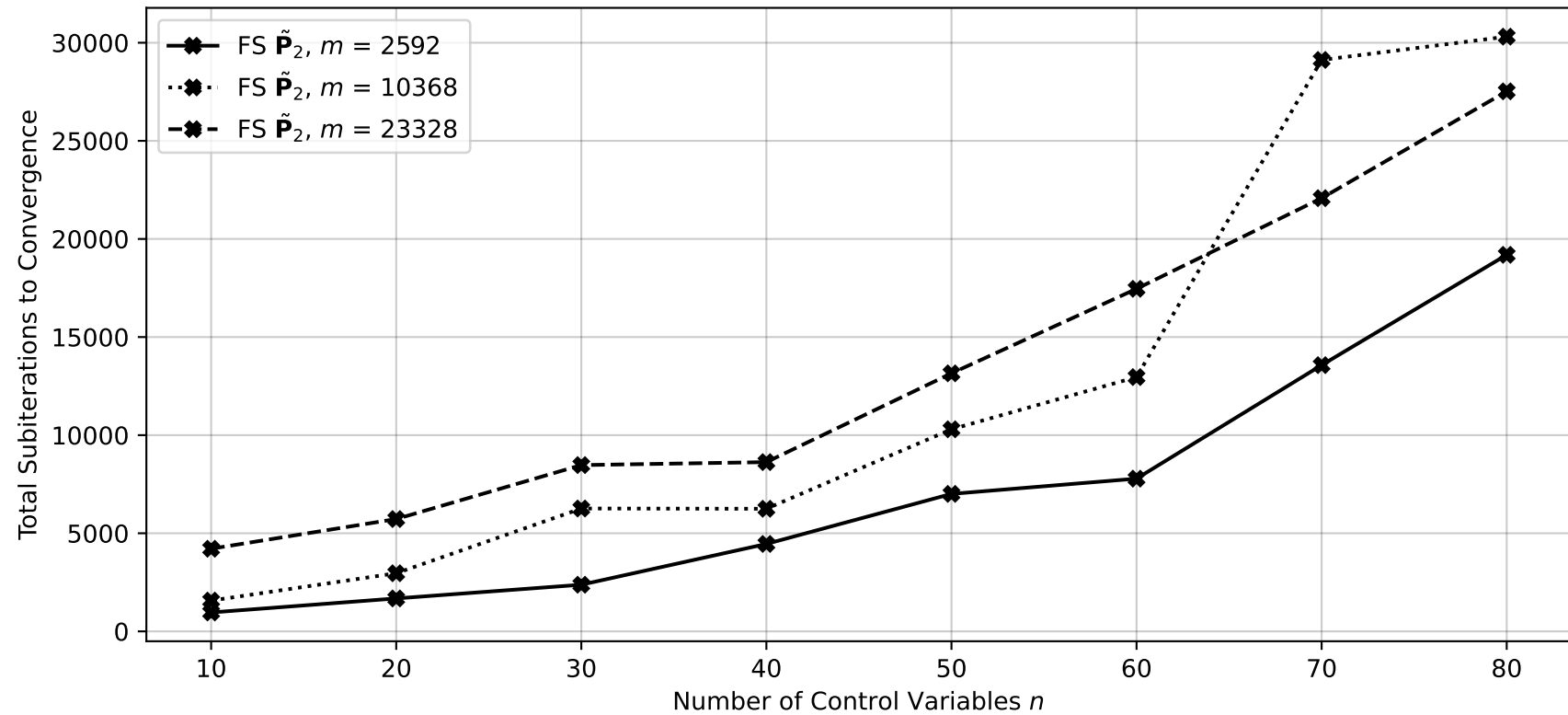
Number of Design Cycles to Convergence

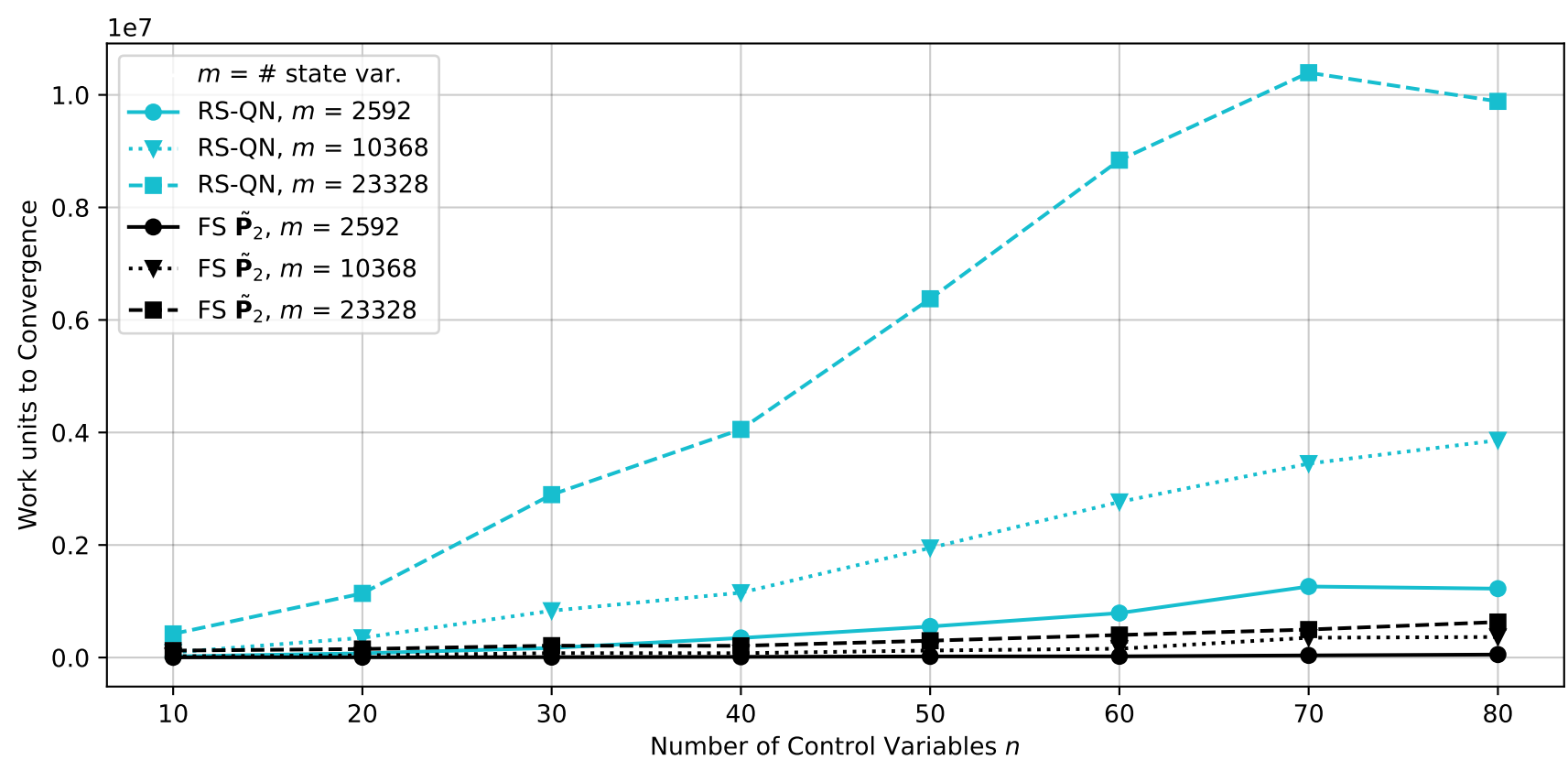


# Work Units vs Control Variables

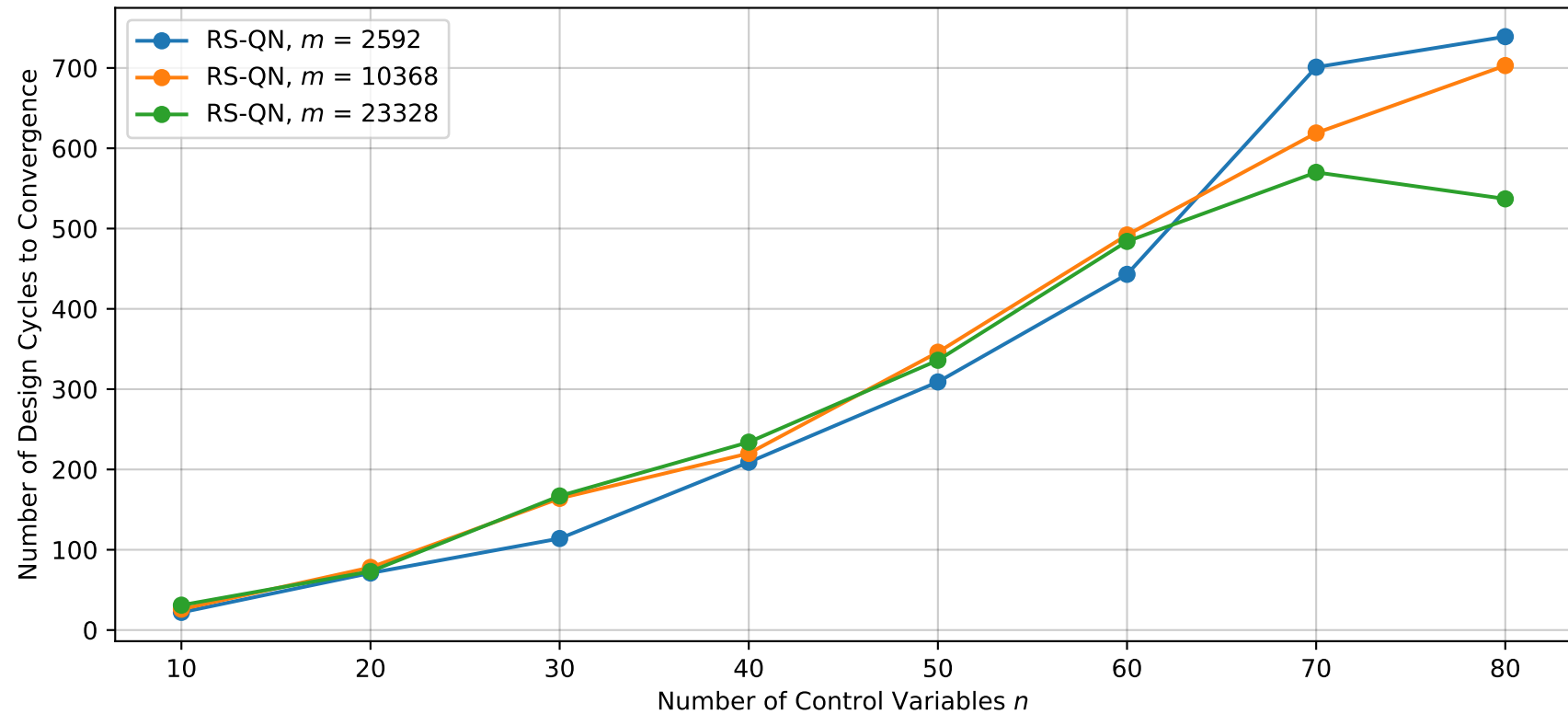


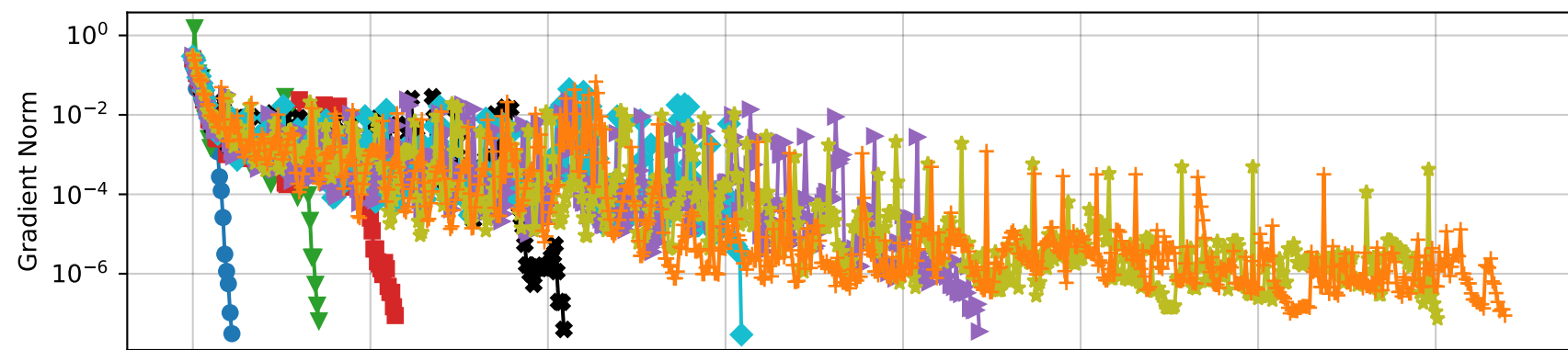
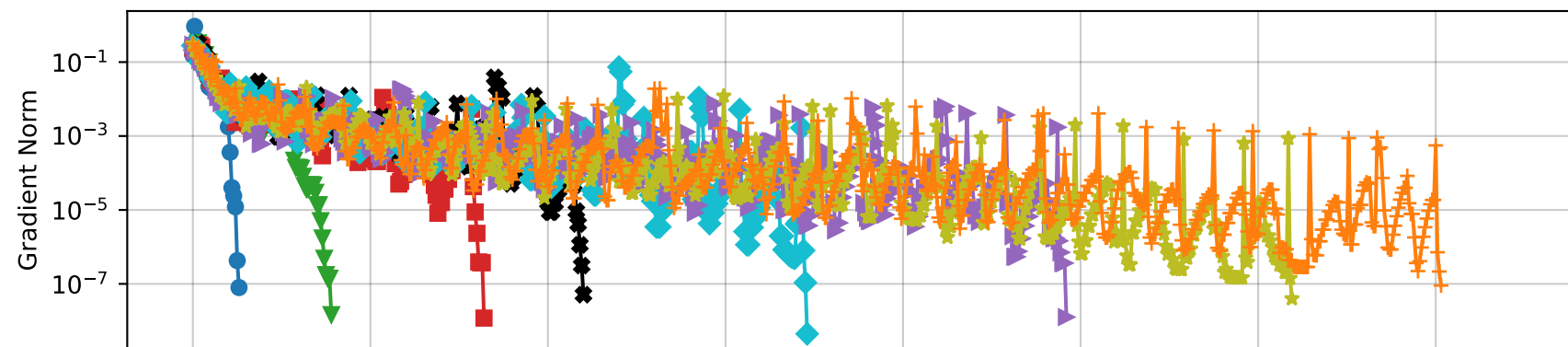
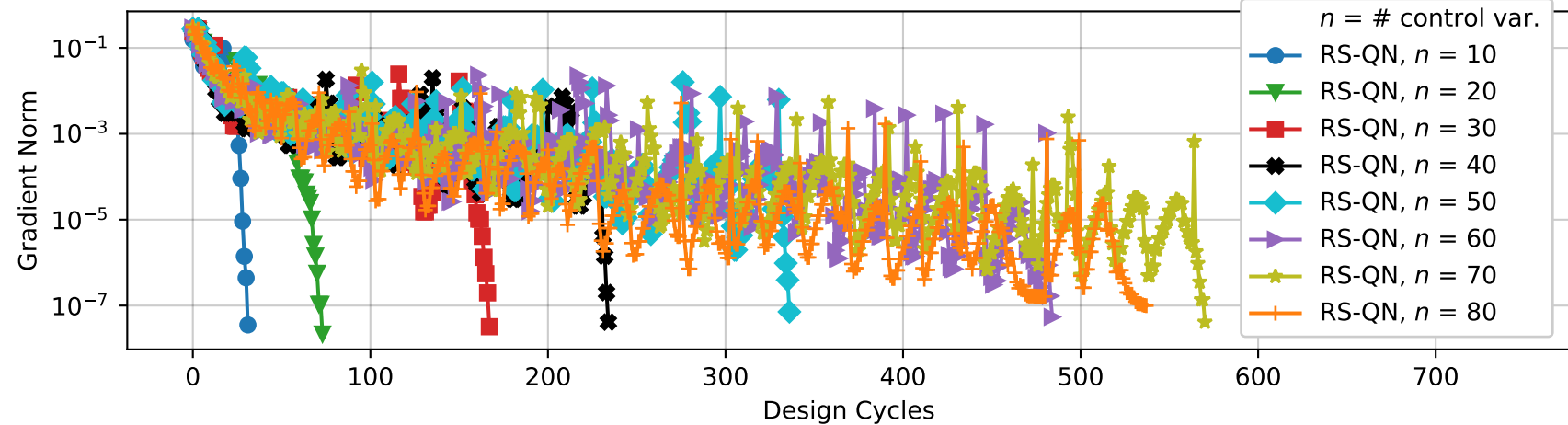
Total Subiterations vs Control Variables





Reduced-space Design Cycles vs Control Variables

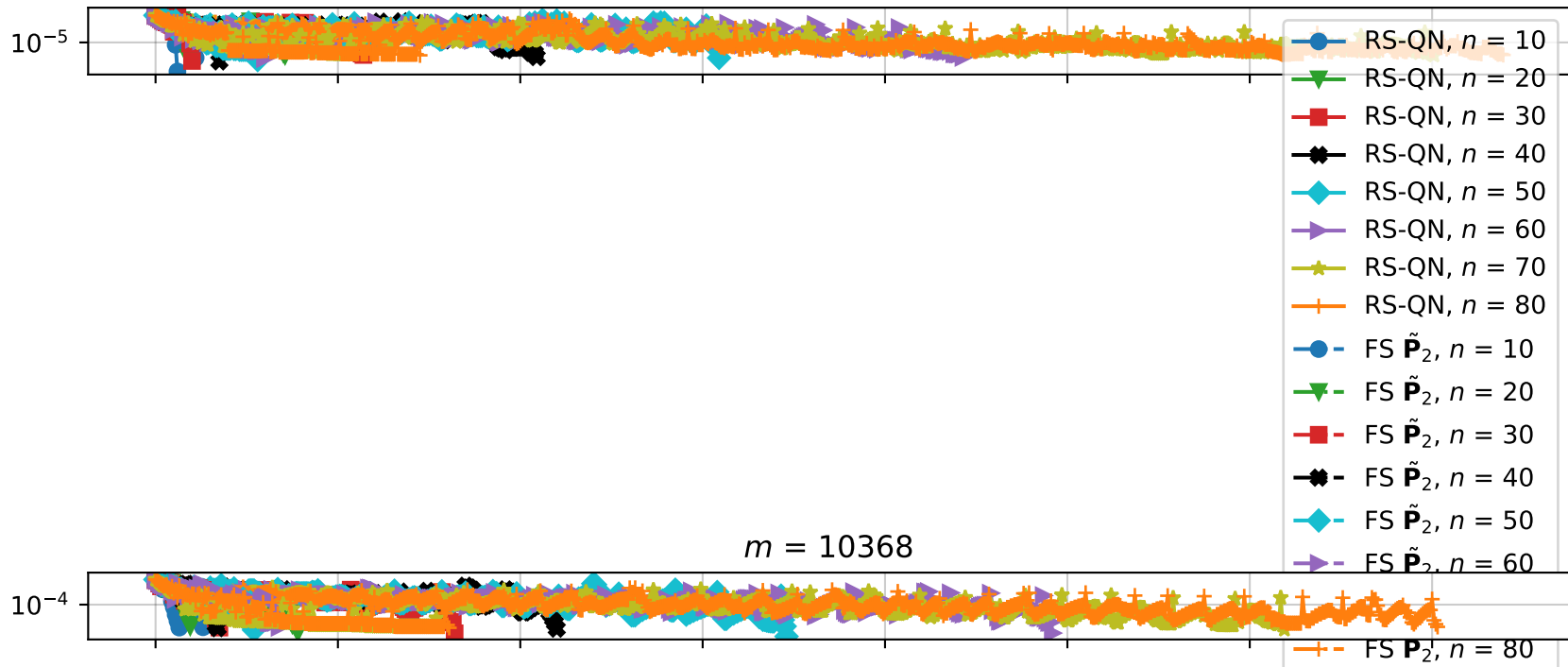


State Variables,  $m = 2592$ State Variables,  $m = 10368$ State Variables,  $m = 23328$ 

# Full-space Gradient vs Design Cycles

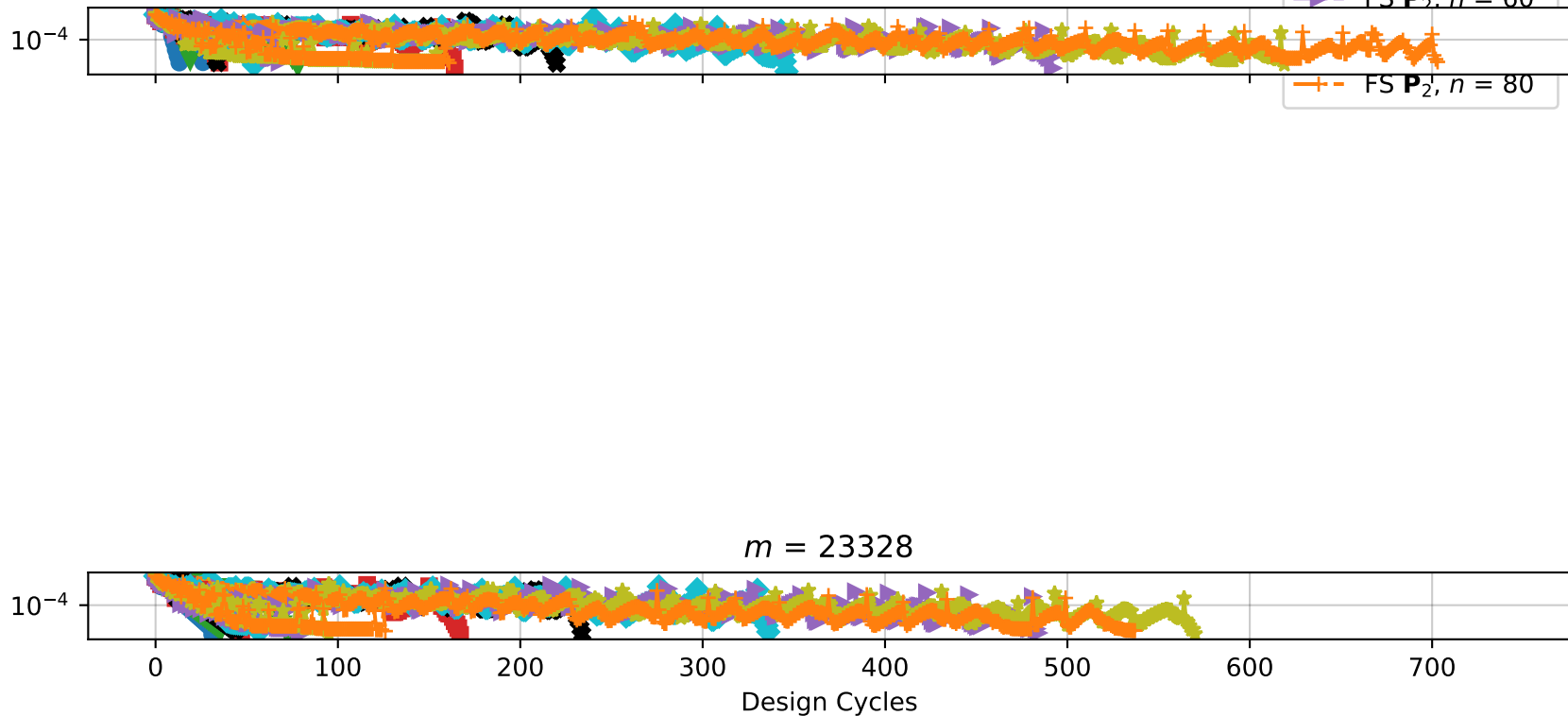
$m = 2592$

Gradient Norm



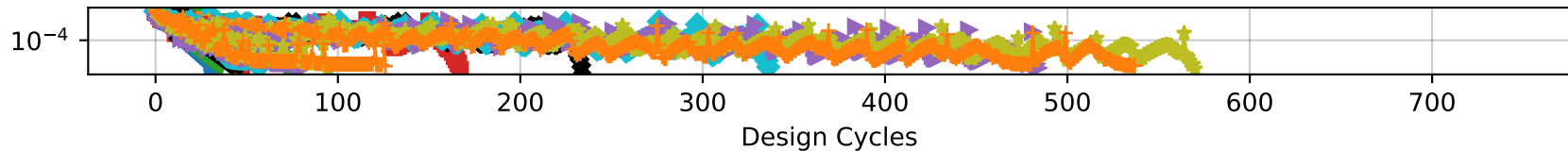
$m = 10368$

Gradient Norm



$m = 23328$

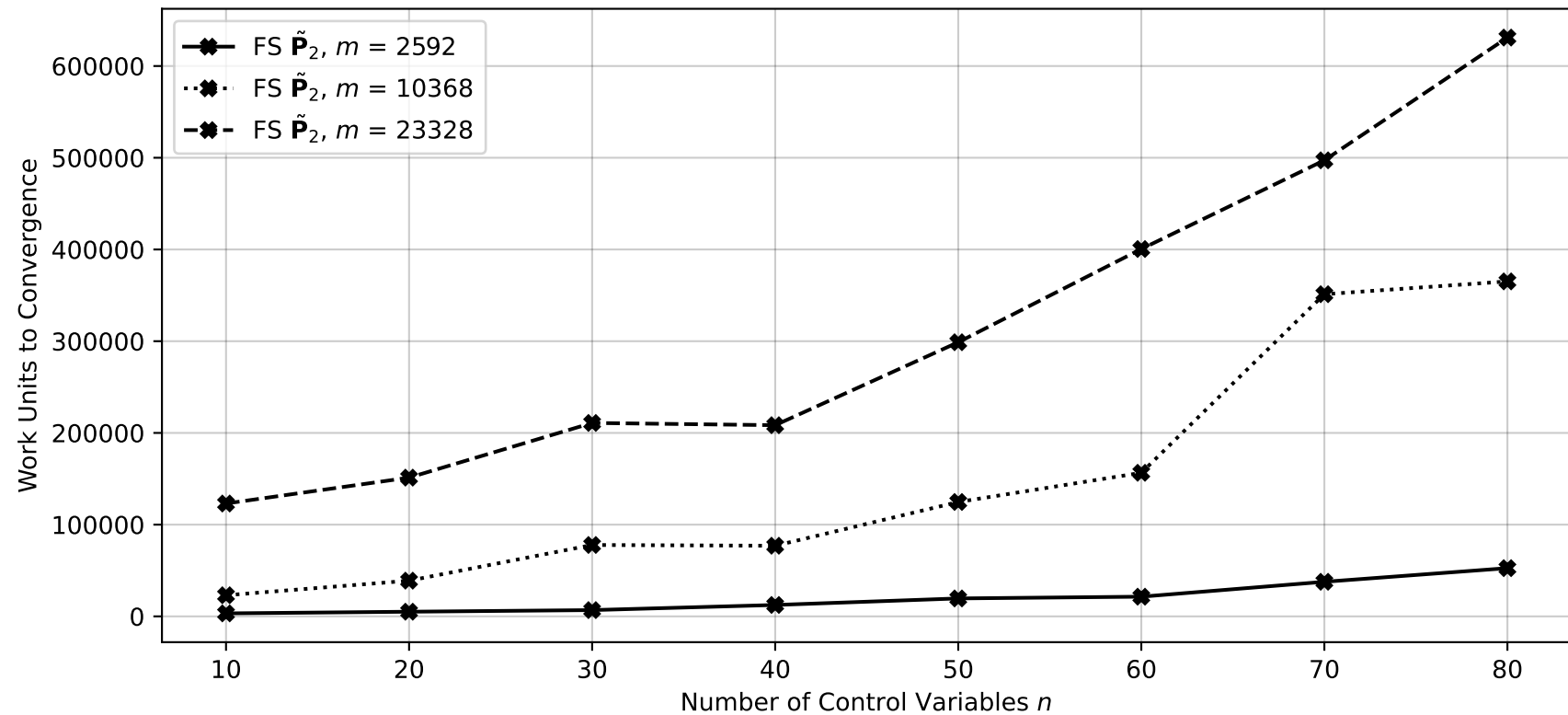
Gradient Norm



Design Cycles



# Work Units vs Control Variables





Gradient Norm vs Design Cycles  $m = 10368$

