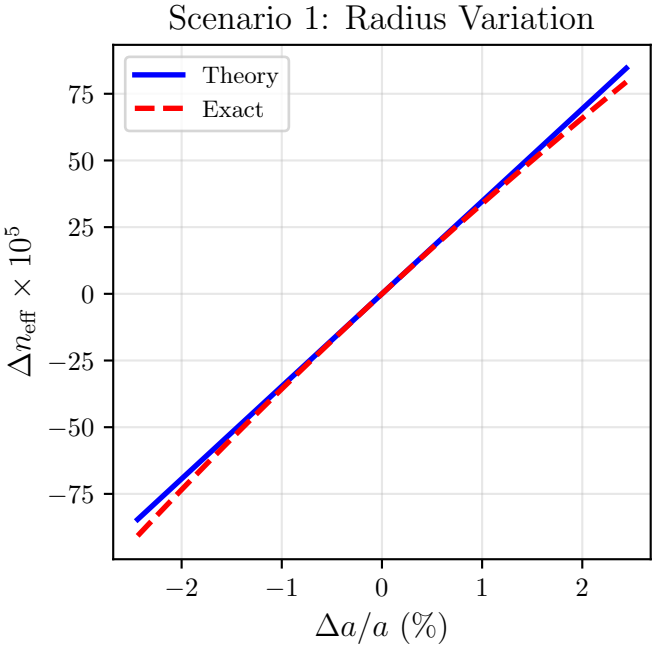
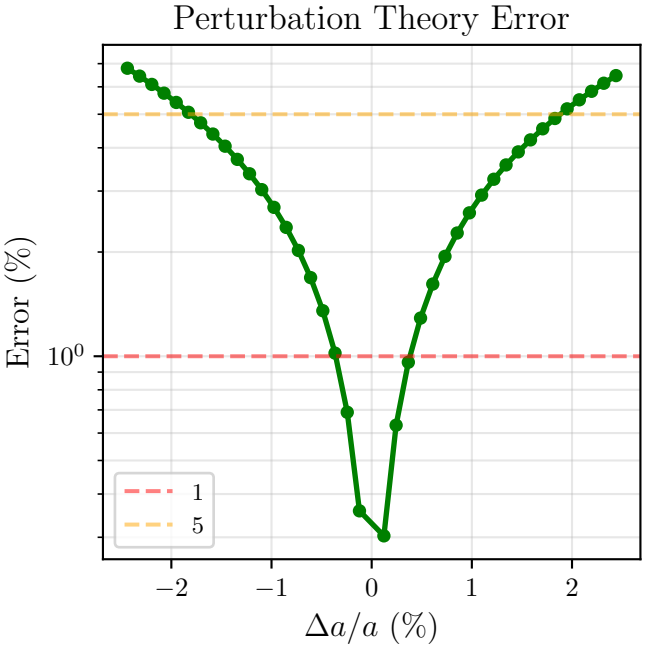
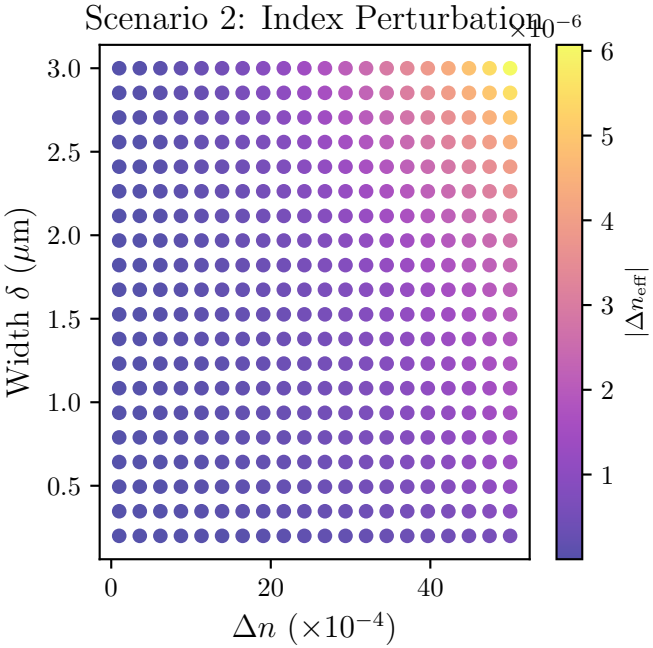
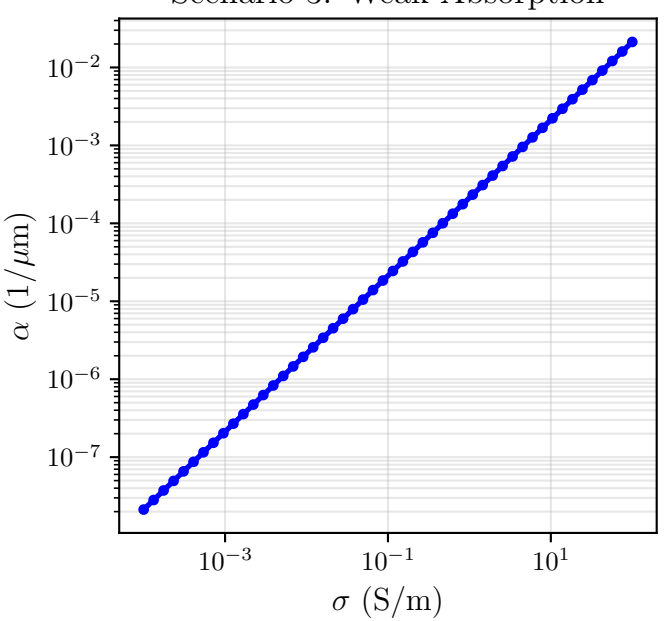
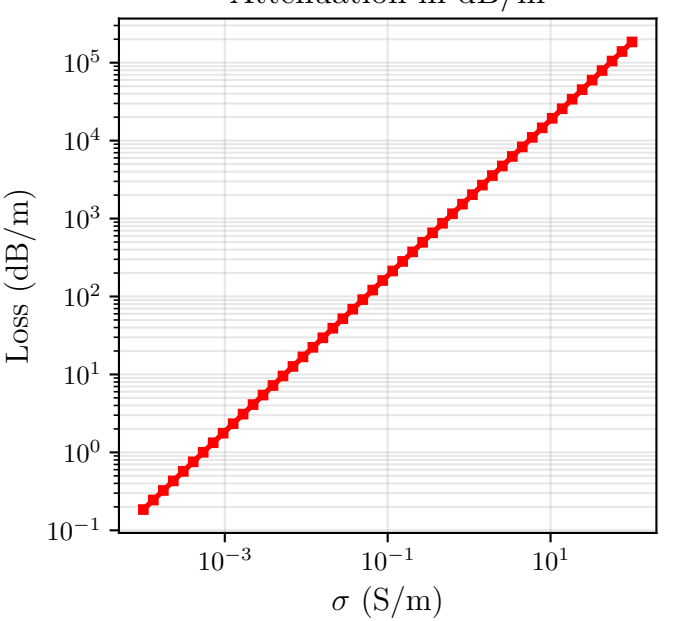
Perturbation Theory: Complete Validation Summary











Perturbation Theory Validation

Scenario 1: Radius Error
Δa range: -0.1 to $+0.1$ μm
Max error: 6.8%
Mean error: 3.5%

Scenario 2: Index Change
Δn range: 10^{-4} to 5×10^{-3}
Width range: 0.2 to 3 μm
$|\Delta n_{\text{eff}}|$ range: 10^{-9} to 10^{-7}

Scenario 3: Absorption
σ range: 10^{-4} to 10^{2} S/m
Loss range: 0.002 to 18500 dB/m