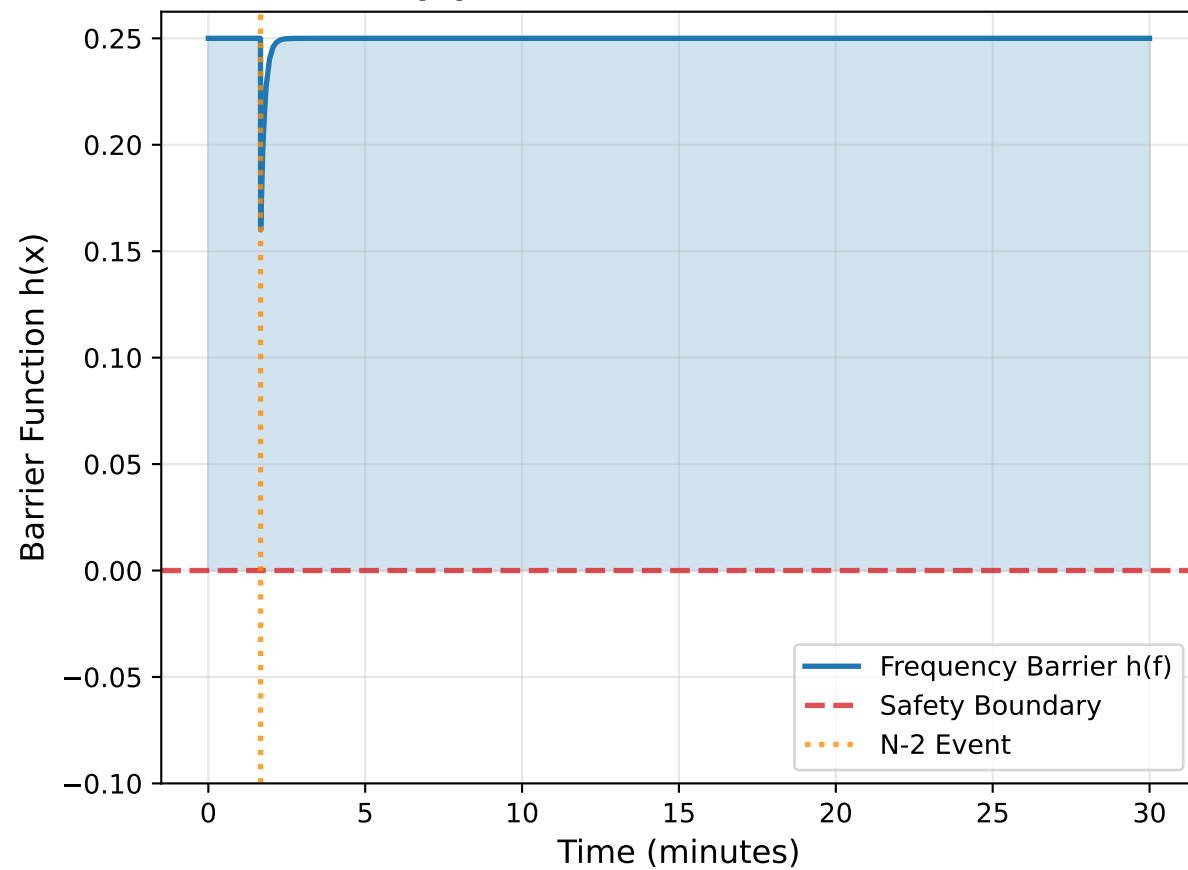


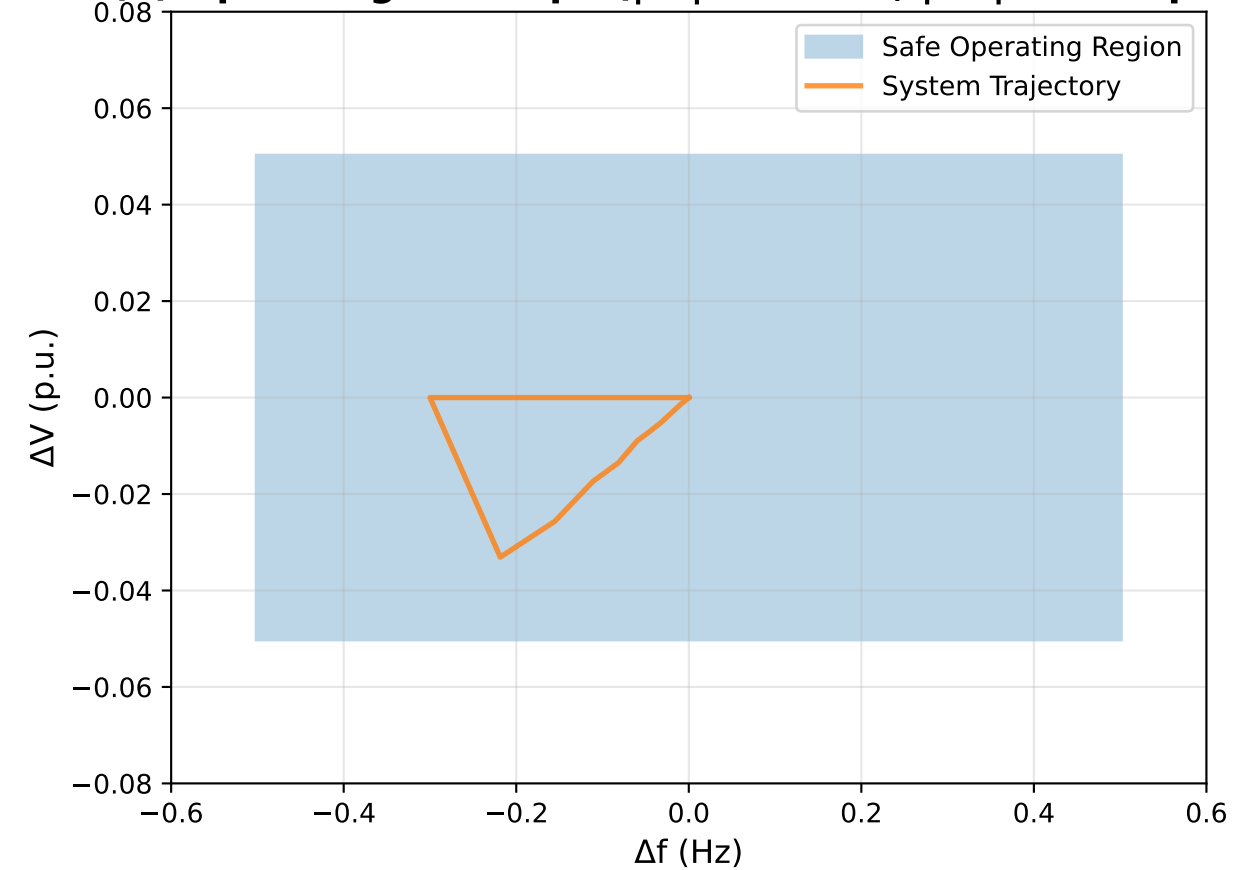
# Control Barrier Function Safety Verification - Realistic Simulation

Test Conditions: Delay = 150 ms (jitter 10-150 ms), Packet Loss = 20% (Bernoulli i.i.d.), Violation dwell = 200 ms,  $h_{\text{freq}} = 0.25 - (\Delta f)^2$ ,  $\Delta t = 0.033$  s (30 Hz)

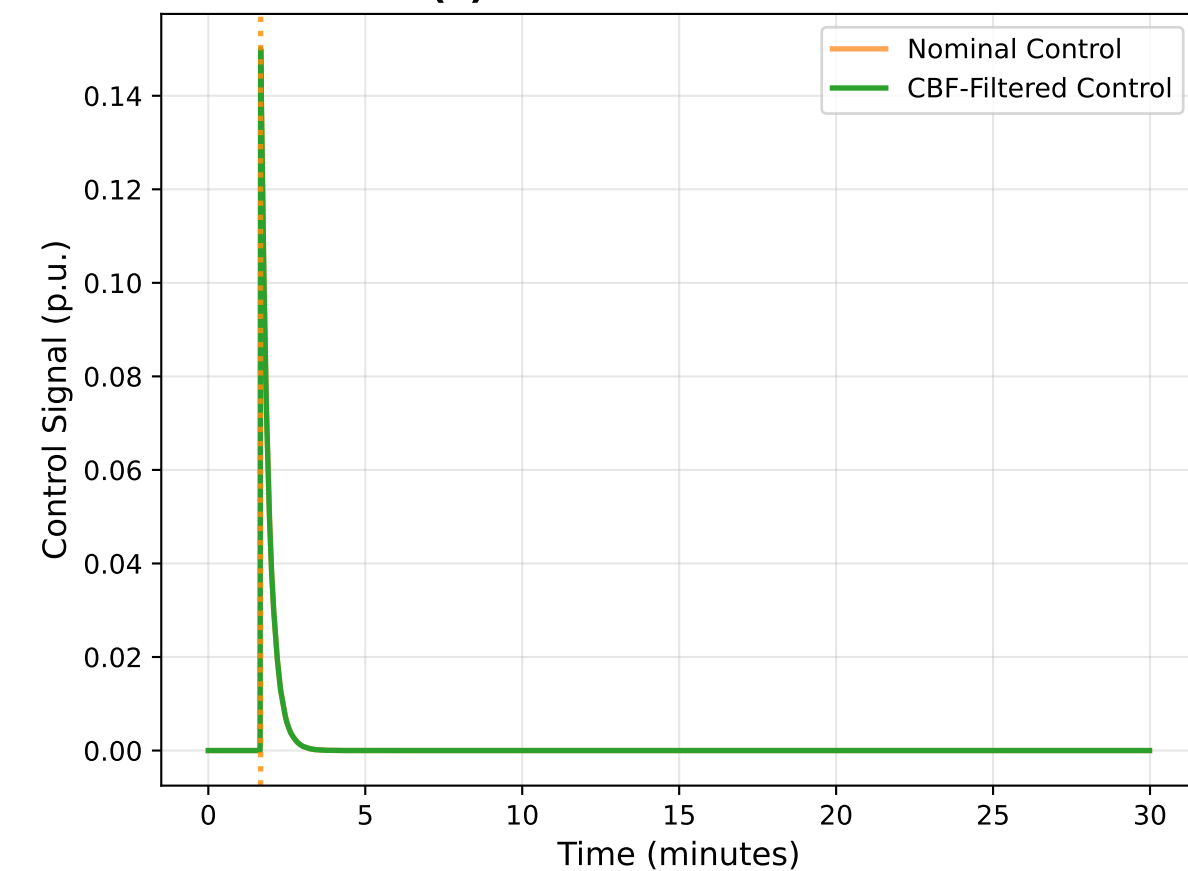
**(a) Real Barrier Evolution**



**(b) Operating Envelope ( $|\Delta f| \leq 0.5$  Hz,  $|\Delta V| \leq 0.05$  p.u.)**



**(c) Control Modification**



**(d) N-2 Contingency Response**

