Solutions to linear roll motion ( $\omega_0$ :0.5 [rad/s],  $\zeta$ :0.1 [-]) analytical numerical 0.1 Φ [rad] 0.0 -0.120 80 60 40 100 0.05 analytical numerical ở [rad/s] 0.00 -0.0520 40 80 60 100 analytical 0.02 numerical 0.00 0.00 0.00-0.0420 40 60 80 100 Time [s]