Stochastic mu-Analysis for launcher thrust vector control systems

Deterministic mu is nowadays very well established in the control analysis community due to its proven capability to perform robust stability and performance analysis for uncertain systems. Nevertheless a common criticism for its use in clearance and certification processes is the lack of quantitative measures on the likelihood occurrence for the identified worst-cases. In addressing this shortcoming, probabilistic mu appeared in the early 1990s but due to the complexity of its calculation it is only recently that toolboxes have started to appear and be used. Probabilistic mu provides a measure of rare events to the worst-case, i.e. they provide upper and lower bounds on the cumulative distribution function of the worst-case gain. In this paper a comparison between deterministic mu and probabilistic mu is presented through their application to the analysis of a study case extracted from the VEGA launcher during the atmospheric phase.