

Abstract

This thesis discusses different modelling methodologies to eke out best performance/stability results than conventional sector-nonlinearity Takagi-Sugeno (also known as quasi-LPV) systems modelling techniques are able to yield.

Indeed, even if LMIs can prove various performance and stability bounds (decay rate, H_∞ , etc.) for polytopic systems, it is well known that the proven performance depends on the chosen model and, given a nonlinear dynamic systems, the polytopic embeddings available for it are not unique. Thus, explorations on how to obtain the model which is less deleterious for performance are presented.

As a last contribution, extending the polytopic Takagi-Sugeno setup to a gain-scheduled quasi-convex difference inclusion framework allows to improve the results over the polytopic models. Indeed, the non-scheduled convex difference inclusion framework was proposed by a research team in University of Seville (Fiacchini, Alamo, Camacho) as a generalised modelling methodology which included the polytopic one; this thesis poses a further generalised gain-scheduled version of some of these results.