A Polytopic Approach for the Nonlinear Unknown Input Functional Observers Design: Application to a Quadrotor Aerial Robots Landing

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Abstract— This paper considers a method of designing functional observers for continuous time nonlinear systems subject to unknown inputs. The proposed approach consists in rewriting the nonlinear model in a polytopic form (also known as multiple or Takagi-Sugeno models) applying the Sector Nonlinearity Transformation (SNT) and then apply the proposed algorithm for the observer design. Sufficient conditions for the asymptotic stability of the estimation error are given in terms of linear matrix inequalities ($\mathcal{LMIs}$) and rank conditions. An application to a quadrotor aerial robots landing is then presented.

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