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Title: *"Uncertainty Propagation in Orbital Mechanics with Generalised Polynomial Algebra"*

Abstract. This paper presents a generalised polynomial algebra to propagate uncertainty sets through dynamical systems. It is assumed that the dynamics is dependent on a number of model parameters and the state of the system evolves from some initial conditions. One or more initial conditions and model parameters can vary within a set Ω. The paper presents an approach to approximate the set Ω with a polynomial expansion and to propagate, under some regularity assumptions, the polynomial representation through the dynamical system. The approach is based on a generalised polynomial algebra that replaces algebraic operators between real numbers with operators between polynomials. The paper first details the proposed technique and then compares, both theoretically and experimentally, its time complexity, for the same accuracy, against its non-intrusive counterpart. Two examples with increasing complexity are used to illustrate the practical applicability of the proposed approach to Orbital Mechanics.

Joint work with: Annalisa Riccardi and Carlos Ortega