

Application of Mass-Pope asymptotic method in the two-species interaction model

Ilea Mihai¹, Arotaritei Dragos², Turnea Marius³
¹ileamihai2004@yahoo.com, ²dragos_aro@yahoo.com,
³tmarius_ro@yahoo.com

Abstract

This article concern one method for reducing large system of two-species interaction system, namely the method of intrinsic low-dimensional manifolds (ILDm) due to Mass and Pope. This iterative method inspired by the phase-space geometry of interaction species involving a fast and a slow species, where the slow manifolds is a curve in the phase plane. A mathematical model for two-species interaction consists of a set of differential equations with small parameter, which describe the time-dependent development of all the proprieties that determine the state of the system. A small parameter μ measures the separation of time scale. The proposed of the application of ILDM algorithm contains the essential steps for a differential system with small parameter, which exhibit dynamic behaviour evolving two vastly different time scales. A trajectory of the system in the phase space can be naturally discomposes into “fast” parts and “slow” parts.

Key words: scaling, phase-plane, singular perturbation, small parameter, steady-state, time-scale, decomposition, reduction, ILDM.

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