

Stability Problems in ODE Estimation

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Abstract: The aim is to compare and contrast the stability of the estimation method based on the embedding of the estimation problem into an optimally posed two-point boundary value problem with that of the simultaneous method which is boundary value free and which imposes the discretization of the differential equation as a set of equality constraints. The embedding method leads to an unconstrained optimization problem and so is computationally simpler, but it does require the solution of a two-point boundary problem at each iteration. This step carries the further implication that the De Hoog, Mattheij result on the equivalence of stability and dichotomy is relevant here. The simultaneous method is computationally more complex (typically involving an SQP algorithm) plus it involves potentially a large set of equality constraints. However, it would seem to be free of the restriction to dichotomic systems brought about by the two-point structure implied by the embedding method.

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