90. Zvi Artstein and Arie Leizarowitz, Singularly perturbed control systems with one-dimensional fast dynamics. SIAM J. Control and Optimization 41 (2002), 641-658.

**Abstract.** The order reduction approach to singularly perturbed control systems suggests employing as a variational limit the differential algebraic system obtained when the small parameter is set to be zero. It is known that the method is valid only under restrictive convergence conditions on the fast dynamics. We verify in this paper that when the fast state variable is one-dimensional, the order reduction method is valid in general. This, however, when appropriate relaxation is allowed in the reduced order system. We also indicate how to extract near optimal solutions to the original system from optimal solutions of the order reduction one, along the traditional lines of separating time scales. Examples are displayed, showing that without allowing the relaxation, the order reduction may not provide the correct limit.

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