Simplification of the Generalized State Equations

Tanel Mullari; Ülle Kotta

Abstract: The paper studies the problem of lowering the orders of input derivatives in nonlinear generalized state equations via generalized coordinate transformation. An alternative, computation-oriented proof is presented for the theorem, originally proved by Delaleau and Respondek, giving necessary and sufficient conditions for existence of such a transformation, in terms of commutativity of certain vector fields. Moreover, the dual conditions in terms of 1-forms have been derived, allowing to calculate the new generalized state coordinates in a simpler way. The result is illustrated with an example, originally given by Delaleau and Respondek (see [2]), but solved in an alternative way.