Mathematical Physics

Routh Reduction by Stages

Bavo Langerock, Tom Mestdag, Joris Vankerschaver

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This paper deals with the Lagrangian analogue of symplectic or point reduction by stages. We develop Routh reduction as a reduction technique that preserves the Lagrangian nature of the dynamics. To do so we heavily rely on the relation between Routh reduction and cotangent symplectic reduction. The main results in this paper are: (i) we develop a class of so called magnetic Lagrangian systems and this class has the property that it is closed under Routh reduction; (ii) we construct a transformation relating the magnetic Lagrangian system obtained after two subsequent Routh reductions and the magnetic Lagrangian system obtained after Routh reduction w.r.t. to the full symmetry group.

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