

Routh Order Reduction Method of Relativistic Birkhoffian Systems

LUO Shao-Kai¹ and GUO Yong-Xin²

¹ Institute of Mathematical Mechanics and Mathematical Physics, Zhejiang Sci-Tech University, Hangzhou 310018, China

² Department of Physics, Liaoning University, Shenyang 110036, China
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Abstract: Routh order reduction method of the relativistic Birkhoffian equations is studied. For a relativistic Birkhoffian system, the cyclic integrals can be found by using the perfect differential method. Through these cyclic integrals, the order of the system can be reduced. If the relativistic Birkhoffian system has a cyclic integral, then the Birkhoffian equations can be reduced at least by two degrees and the Birkhoffian form can be kept. The relations among the relativistic Birkhoffian mechanics, the relativistic Hamiltonian mechanics, and the relativistic Lagrangian mechanics are discussed, and the Routh order reduction method of the relativistic Lagrangian system is obtained. And an example is given to illustrate the application of the result.

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Key words: relativity, Birkhoffian system, Lagrangian system, cyclic integral, order reduction method

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