

Whittaker Order Reduction Method of Relativistic Birkhoffian Systems

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Abstract: The order reduction method of the relativistic Birkhoffian equations is studied. For a relativistic autonomous Birkhoffian system, if the conservative law of the Birkhoffian holds, the conservative quantity can be called the generalized energy integral. Through the generalized energy integral, the order of the system can be reduced. If the relativistic Birkhoffian system has a generalized energy integral, then the Birkhoffian equations can be reduced by at least 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 Whittaker 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, energy integral, order reduction method

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