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数学

相对论谐振子解析逼近解的构造

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摘要:

利用牛顿谐波平衡法构造相对论谐波振子的解析逼近周期和周期解. 先引入新变量, 重写关于新变量的控制方程, 再用牛顿谐波平衡法求解. 结果表明: 该方法具有较快的收敛速度; 得到的解析逼近解在振幅全部取值范围内均有效; 构造的解析逼近周期和周期解具有较高的精度.

关键词: 相对论谐振子; 牛顿谐波平衡法; 解析逼近解

Construction of Analytical Approximate Solutions to Relativistic Harmonic Oscillators

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Abstract:

The Newton harmonic balance method was used to construct analytical approximate periods and periodic solutions to the relativistic harmonic oscillator. Introducing a new variable and rewriting the control equation in terms of the new variable, we applied the Newton-harmonic balance method to solving the resulted equation. The method yields rapid convergence with respect to exact solution, and the analytical approximations obtained are valid for the whole range of initial oscillation amplitudes . The approximate periods and periodic solutions are excellently agreed with the exact ones.

Keywords: relativistic harmonic oscillators Newton harmonic balance method analytical approximation

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