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On the solution of strong nonlinear oscillators by applying a rational elliptic balance method

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A rational elliptic balance method is introduced to obtain exact and approximate solutions of nonlinear oscillators by using Jacobi elliptic functions. To illustrate the applicability of the proposed rational elliptic forms in the solution of nonlinear oscillators, we first investigate the exact solution of the non-homogenous, undamped Duffing equation. Then, we introduce first and second order rational elliptic form solutions to obtain approximate solutions of two nonlinear oscillators. At the end of the paper, we compare the numerical integration values of the angular frequencies with approximate solution results, based on the proposed rational elliptic balance method.

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