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# Nonlinear Damped Oscillator with Varying Coefficients and Periodic External Forces

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**Abstract:** A modified harmonic balance method (MHBM) has been exhibited for operating the damped Duffing oscillator with varying coefficients and periodic external forces. The mentioned technique is able to convert a set of nonlinear algebraic equations into a set of linear algebraic equations using only a nonlinear algebraic equation and it makes the simplest form of the system and requires less computational effort than the classic harmonic balance method (HBM). On the contrary, a set of nonlinear algebraic equations is required to solve by the numerical technique in classic HBM. As a result, it needs a heavy computational attempt. The obtained results have been compared with the numerical solutions attained by the fourth order Runge-Kutta method in the Figures and Table. It is mentioned that the obtained results display a strong similarity with the corresponding numerical results.

**Keywords:** *harmonic balance method; nonlinear oscillators; varying coefficients and periodic forcing term.*

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