

STEADY-STATE RESPONSE OF A NON-LINEAR HARMONICALLY EXCITED DUFFING OSCILLATOR WITH ZERO LINEAR RESTORING FORCE

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Key Words: *Series Expansion, Strong Non-linearity, Steady-State, Amplitude-Frequency Responses.*

ABSTRACT

In this paper damped and undamped harmonically excited Duffing oscillators with only cubic non-linearity are considered. The equations of motion are transformed in a form suitable for the application of a classical series expansion technique. The Linstedt-Poincaré method and the method of multiple scales are then used to obtain a steady-state response at the frequency of excitation. An approximate solution for a periodic motion and the corresponding amplitude-frequency equation are found. The results obtained are compared with numerical results, and with analytical results from the literature [1]-[5]. It is demonstrated that the approaches outlined in this paper are accurate, simple and easy to use. It is also shown that they work well even for the case when the parameter of non-linearity is not small.

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