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*The Analysis of The Numerical Harmonic Balance Method: on Duffing's Oscillator*

This study focuses on a novel harmonic balance formulation, which is much easier to implement than the standard/classical harmonic balance method for complex nonlinear mathematical models and algorithms. Both harmonic balance approaches are applied to Duffing's oscillator to demonstrate the advantages and disadvantages of the two approaches. A fundamental understanding of the difference between these two methods is achieved, and the properties of each method are analyzed in detail.