

Energy efficiency of the Duffing system with a potential disturbed by a harmonic oscillator

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We analyse a Duffing system magnetically coupled to a harmonic oscillator. The magnetic interaction is described by an experimentally derived formula [1]. Numerical analyses determine the power either dissipated by or supplied to the Duffing system by its individual components. In all simulations, the Duffing potential itself is not changed. The analyses focuses on assessing the impact of the perturbing system parameters on the energy efficiency of the system. We demonstrate that the effect of changing the value of the mass, the damping and the elasticity of the perturbing system. We focus on searching for configurations of the perturbation for which an increase in the efficiency of the perturbed Duffing system is observed compared to the efficiency of the unperturbed system. The obtained results show that in certain configurations the perturbing system increases the efficiency of the Duffing system both by modifying its dynamics and by providing additional energy.

References

- [1] A Rysak, M Gregorczyk, K Chwełatiuk, and D Gąska, *Study of the High-Amplitude Solutions in the System of Magnetic Sliding Oscillator with Many Degrees of Freedom*, Springer Proceedings in Mathematics and Statistics 248, 295–310 (2017)

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