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Suppressing Self-Excited Vibrations in a Coupled Pendulum System

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The main objective of this contribution is to show the phenomenon of full vibration suppression of a simple two degree of freedom model by interaction between self-excitation and parametric excitation. We investigate a mechanical system consisting of two pendulums in a gravity field. Both pendulums are coupled by a linear spring-element. Self-exciting forces are acting on one pendulum while the pivot of the second pendulum is periodically excited (parametric excitation). Using the averaging method general conditions for full vibration suppression are derived for the linearized system with harmonic stiffness variation. These analytical results are compared with results obtained from numerical time integration of the linearized and the original non-linear system.

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