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## **Abstract**

The aim of this work is to formulate a demonstration for the Averaging Theorem using classical analysis methods. In order to do that we studied some results that was used as the theoretical basis, such as the Liapunov Stability Theorem. Moreover, we will apply the Averaging theorem to a physical system with two degrees of freedom, wich is composed by a single mass with nonlinear coupling and parametric excitation. Thus, the investigation of the existence and stability of periodic orbits in this system is reduced to studying the stability of equilibrium points of the average system. This study was made using the Routh-Hurwitz stability criterion.

*Keywords:* Ordinary differential equations, Averaging Method, Non-linear Dynamics.