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非完全阻尼力学系统的渐近稳定性

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ASYMPTOTIC STABILITY OF PARTIALLY DAMPED MECHANICAL SYSTEMS

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摘要

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摘要 本文研究了非完全阻尼(部分阻尼)情况下力学系统的渐近稳定性问题。建立了陀螺系统和陀螺系统的渐近稳定性的充分必要条件。在研究中将系统进行了分解,因之结果比较简单且有助于分析一些力学现象。

关键词:

Abstract: In this paper the asymptotic stability of the partially damped linear mechanical system with gyroscopic forces is studied. The equation of motion for the system is a second order linear matrix differential equation. The stiffness matrix is assumed to be positive definite representing the conservative forces and then Lyapunov's second method is employed. By splitting the system matrices in block matrices the condition of asymptotic stability (e. g. the condition of pervasiveness) can be expressed as a rank condition of certain matrix with dimension lower than that of the system. Several cases with different gyroscopic coupling are discussed. The stability condition is not only simpler than that obtained by former authors, but also gives some insight to the mechanical properties of the system since it may be considered as two coupled subsystems then.

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