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Stability of a Self-Excited Machine Due to the Mechanical Coupling

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Abstract : Generally, different rods in shaft systems can be misaligned based on the mechanical system usages. These rods can be linked together via U-coupling easily. The system is self-stimulated and may cause instabilities due to the inherent behavior of the coupling. In this study, each rod includes an elastic shaft with an angular stiffness and structural damping. Moreover, the mass of shafts is considered via attached solid disks. The impact of the system architecture and shaft mass on the instability of such mechanism are studied. Stability charts are plotted via a method based on Floquet theory. Eventually, the unstable points have been found and analyzed in detail. The results show that stabilizing the driveline is feasible by changing the system characteristics which include shaft mass and architecture.

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