Effect of servomotor control parameters on the dynamic behaviour of a coupled elastic shaft-elastic beam system

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Abstract: In this study, a servomotor-driven coupled elastic shaft-elastic beam system is analysed. This mechanism has considerable applications in the industry and can be present in vehicles. Equations of motion are derived with respect to the generalised coordinates of the elastic shaft, elastic beam and the servomotor rotation. Frequency equations and mode shapes for the elastic beam and elastic shaft are obtained assuming compliant boundary conditions. Non-linear terms, which come from the Coriolis, normal and tangential accelerations, are retained in the equations. The eigenvalues of the relatively elastic shaft-elastic beam system and relatively rigid shaft-elastic beam system are analysed with respect to the desired control frequencies and dampings of the servomotor.

Keywords: servomotor; control frequency; elastic shaft; elastic beam.

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