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GEOMETRICAL NONLINEAR COMPUTATIONAL ANALYSIS ON AN INTENTIONAL MISTUNING OF A BLADED-DISK

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In the framework of linear dynamic analysis of bladed disks, intentional mistuning is an innovative way for reducing the sensitivity of the forced response of bladed disks to mistuning induced by the manufacturing tolerances and the small variabilities of mechanical properties (see for instance [1, 2, 3]). Taking into account dry friction [4] and, recently, geometrical nonlinearities [5] in the dynamics of bladed disk are of particular interest. In this paper, we present an analysis of the effects of geometrical nonlinearities on an intentionally mistuned bladed disk. The finite element method was used to construct a simplified bladed-disk containing 24 blades. Two different blades types are used to allow for defining a pattern with 22 blades of type 1 and 2 blades of type 2. A projection basis is computed and both a linear and a nonlinear reduced-order model (ROM) are constructed for the defined bladed disk. A comparison of the dynamic response between the mistuned bladed disk computed with the linear ROM and the one computed with the nonlinear ROM is performed in order to analyse the effects of nonlinearities on the intentional mistuning. The numerical results obtained show the significant influences of the nonlinear geometrical effects in the dynamic responses.

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