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### **Vibration and stability analysis of high speed rotating annular disks and rings**

An analytical solution is developed to conduct modal analysis for the in-plane vibration of high speed viscoelastic rotating annular disks and rings. In development of this analytical approach, two-dimensional elasto-dynamic theory is employed and the viscoelastic material for the medium is allowed by assuming complex elastic moduli. The general governing equations of motion are presented and a solution for a rotating disk with different boundary conditions is developed. Computed results for a wide range of rotating speeds and radius ratios, such as those for solid disks or thin rings are provided. The proposed solution is used to investigate the influences of hysteretic material damping on dimensionless natural frequencies and modal loss factors for the rotating disks. In addition, the solution presents non-dimensional critical speeds of rotation for any given disk. Moreover the analysis is extended to consider the effect of adding disk segment, with different material on the inner or outer sides of a disk, on the natural frequencies and critical speeds of the equivalent single disk. The dimensionless results for these cases are also depicted for a wide range of rotational speeds.

### **Biography**

Hamid R Hamidzadeh received his PhD in Applied Mechanics from Imperial College where he conducted Postdoctoral research for four years. He chairs the Mechanical and Manufacturing Engineering Department at Tennessee State University. He is Fellow of ASME and a Distinguished Member and Fellow of SDPS. He has published three books and over 186 articles. He serves as Co-Editor and Editorial Board Member for five journals. He has organized major conferences and has served ASME as Chair of the Special Divisions Steering Committee, Conference Planning Committee, Executive Committee of Design Division, and Vice Chair of the Board on Technical Knowledge Dissemination.

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