

Natural Frequencies and Mode Shapes of Rotating Three Shrouded Bladed Discs Placed on the Part of the Shaft

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ABSTRACT

Fatigue failure of rotor blades is one of the most serious problems facing designers of modern aircraft gas turbine engines. To come up with a successful design, it is of practical importance to be able to predict the natural frequencies of rotating bladed-disc assemblies under operating conditions during the design stage.

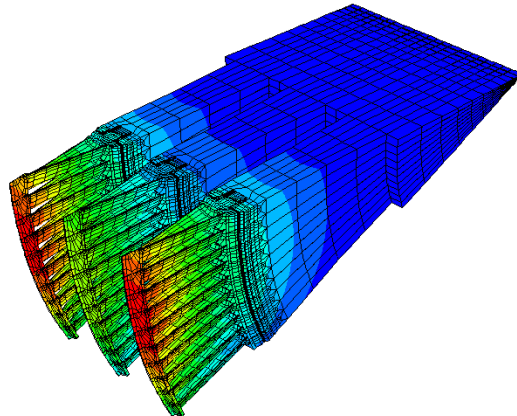


Fig. 1 Mode Shape of the three shrouded bladed discs placed on the shaft for the second group

In this paper the natural frequencies of rotating single shrouded bladed disc, shrouded bladed disc placed on the part of the shaft, two and three shrouded bladed discs placed on the part of the shaft are presented. The mode shapes are calculated by using a finite element cyclic symmetry approach. The gyroscopic effects are neglected. The numerical results were compared with the experimental.

The calculations show the influence of the shaft on the natural frequencies of the shrouded bladed discs. The inclusion of the shaft in the model modifies the interference diagram and mode shapes and it's important from the design point of view. The influence of shaft flexibility on modes shapes of shrouded bladed discs up to four nodal diameters is noticeable. For these modes the natural frequencies of the bladed discs with the part of the shaft are smaller than corresponding modes of the bladed disc without the shaft.