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FE Analysis of Blade-Disc Dovetail Joints Using Mortar Base Frictional Contact Formulation

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Abstract : Analysis of blade-disc dovetail joints is one of the biggest challenges facing designers of aero-engines. To avoid comparatively expensive experimental full-scale tests, numerical methods can be used to simulate loaded disc-blades assembly. Mortar method provides a powerful and flexible tool for solving frictional contact problems. In this study, 2D frictional contact in dovetail has been analysed based on the mortar algorithm. In order to model the friction, the classical law of coulomb and moving friction cone algorithm is applied. The solution is then obtained by solving the resulting set of non-linear equations using an efficient numerical algorithm based on Newton–Raphson Method. The numerical results show that this approach has better convergence rate and accuracy than other proposed numerical methods.

Keywords : computational contact mechanics, dovetail joints, nonlinear FEM, mortar approach
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