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# FRICTION DAMPING

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## ABSTRACT

An alternative calculation procedure is developed to handle dynamical contact problems with friction, see [1]. Most of the technical systems with friction contacts can be reduced to linear elastic bodies contacting each other, where the contact behavior is modeled nonlinear. The modal description of the spatial vibrating elastic bodies leads to a reduction of the degrees of freedom of the system and hence to a reduction of the numerical problem. Due to the non-linearity of the contact behavior and the spatial motion, the generally extended contact area is discretized. For each discretized contact area, the developed point contact model is used to describe the normal and tangential contact forces including microslip effects due to roughness. The Harmonic Balance Method is used to linearize the normal and tangential contact forces. This leads to a complex stiffness matrix, where the components are nonlinearly dependent on the relative displacements of the contact surfaces.
An experimental setup with three elastic structures and two macroscopic non-Hertzian contacts is used to verify the calculation method. The measurements of the spatial motion for bending as well as torsional vibration of the elastic structures show a good agreement with the corresponding calculations. Furthermore, spin spit tests and a tube with extended contact are used to verify the method.
Parameter studies of bladed disk assemblies with different couplings are performed to optimize the spatial dynamic behavior.

## REFERENCES

[1] Sextro W.: Dynamical Contact Problems with Friction. Methods, Models, Experiments and Applications, 2th Edition, Springer, 2007, ISBN 978-3-540-69535-6.