

CASE STUDY

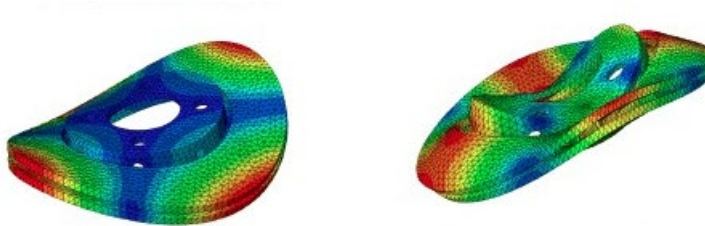
Investigation on analytical solution for the modal analysis of a circular disc and its implementation in the experimental modal analysis of a disc brake

Vibrations in a resonant state can cause dangerous states with extreme vibration amplitudes. Under certain operating conditions such states can lead to material damage, which in turn may endanger not only the operation of systems but may even lead to severe hazard for human.

In this case study the object under investigation is a disc brake used in car wheels. It should be experimentally investigated through a modal analysis which should be performed in the lab using available equipment to identify the eigenfrequencies and mode shapes in the frequency regions of interest. To achieve steady excitation conditions an automatic modal hammer should be implemented. For that purpose a thorough study of the equipment and its specifications should be performed to set and use the mess chain properly.

In parallel a literature research should be performed to investigate analytical solution of the modal analysis (determining the eigen frequencies and eigen forms) of a circular disc, with particular focus on investigation of in-plane modes and corresponding eigenfrequencies. A normalized parametrization of the disc should be performed, which enables to investigate the frequency ranges of occurring modes, particularly the inplane modes. This study should serve to identify the expected frequency ranges for the experimental modal analysis of the disc brake under study.

The results for the simplified analytical case and for the disc brake should be compared, analysed and documented accordingly.



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