Fatigue Life Estimation of Cooling Module of Commercial Truck using Modal Superposition Method

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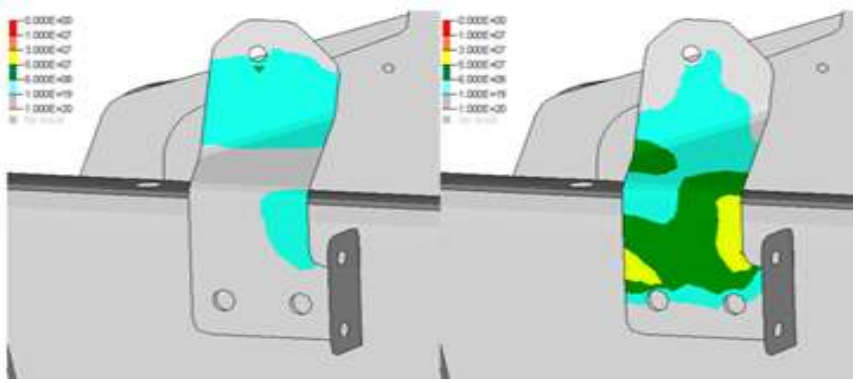
Abstract:

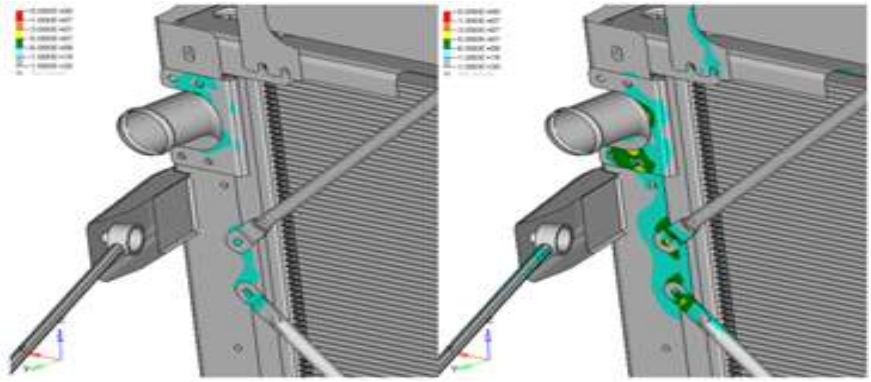
Most of the failures occurring in automobile are due to fatigue damage of the components under dynamic loading. In structural component design of vehicle systems, the appropriate criterion for fatigue failure should be based on consideration of failure modes of the specific component being designed.

Experimental testing method may be the most exact for evaluation of dynamic stresses or strains in components of vehicle systems. They are also expensive and time consuming. Several analytical approaches like quasi-static method, direct transient method for dynamic stress calculation in structural components have been developed to speed design cycles by using computational power. In this project, focus is on evaluating fatigue life using modal superposition method which takes dynamic effect into consideration.

The accuracy of the durability evaluation method discussed here depends on the quality of structural modes obtained from simulation and damping. Modal superposition based analysis is a straight forward method for replicating dynamic event in shaker test of the radiator which is intended for the structural durability evaluations.



Results for quasi-static method and modal superposition for side support



Results for quasi-static method and modal superposition for bracket