

## EVALUATION OF DIFFERENT DAMPING TREATMENTS ON FATIGUE RESPONSE OF FREIGHT WAGONS

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**Summary:** Fatigue is a major concern for any structure subject to stochastic excitation and, consequently, alternate stresses. This is particularly true for freight wagons, where a combination of huge loadings and high velocities imposes the necessity of simple solutions for suspension systems, with few movable parts and robust designs. In view of this scenario, it makes sense that the most common choice of damping between the main platform and the bogies has been dry friction. However, it has been pointed out by some researchers that viscoelastic treatments can attenuate vibrations much more efficiently in this case, albeit demanding typically greater and costlier investments. The present research aims at investigate the influence of the adopted damping solution in the stress amplitudes of a lab-sized model of a freight wagon, comparing the dynamic behaviour when using conventional dry friction against the use of viscoelastic absorbers. This scaled model, though not perfectly detailed, is similar enough as to permit the looked-for verifications to be inferred, and modal parameters to be experimentally identified, with special focus on damping ratios. Then, a numerical counterpart of this lab demonstrator will be carefully modelled considering the previously identified modal damping, so that fatigue analysis can be confidently performed with it. Finally, an assessment of the potential gains in using one damping treatment or another, or both, shall be presented based on the obtained results.