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LAOS-MEASUREMENT: HOW CAN IT BE USED FOR MATERIAL CHARACTERIZATION?

Dynamic mechanical analyses at high amplitudes (LAOS = **L**arge**A**mplitude**O**scillatory**S**hear) were avoided because of their difficult interpretation. Examinations in the linear-viscoelastic region (SAOS = **S**mall**A**mplitude**O**scillatory**S**hear) were used instead. Mechanical different materials can behave similarly under small deformation, whereas high performance materials often are subject to loads outside of this domain. Therefore, examination at large deformations with irreversible effects for the material are particularly of interest.

Suitable materials for such examinations are e. g. structural adhesives, essential for modern car body constructions. During development, they have to be optimized with respect to their fatigue and crash behavior. Load in the crash region is accompanied with extreme amplitudes and frequencies and currently can only be evaluated with elaborate experiments (e.g. impact shear test). During adhesive development, relatively easily achievable, rheological examinations, as there are dynamic mechanical analyses under high amplitude conditions (LAOS) could be used as a screening method to reduce the number of expensive impact shear tests. Furthermore, these experiments can increase the basic understanding of materials with additional physical descriptors.

It is shown, which material parameters can be obtained with LAOS examinations compared to measurements in the linear-viscoelastic region. First investigations of epoxy adhesives with and without crash suitability are presented and discussed. The chosen examples show, that the method enables a differentiation. The results can be confirmed by accompanying impact shear tests. Although, classical quantitative definitions of the transition from small (SAOS) to large amplitudes (LAOS) don´t apply for such structural adhesives.