Vehicle Safety Institute

VSI

Strain rate dependent characterization of glass fiber reinforced composites for validation of a material model in LS-DYNA

Background

Glass fiber reinfored composites are becoming increasingly important in lightweigt constructions within the automotive industry. In order to use fiber reinforced composites for load bearing components the material has to withstand high mechanical stresses especially during crash scenarios. Therefore it is essential to understand the strain rate dependent behaviour.

Your goal in this thesis is to determine the strain rate effect on glass fiber reinforced composites with the help of various testing machines including a Split Hopkinson bar. Furthermore, the prepared test data has to be used for the validation of an already existing material card in the Finite Element (FE) code LS – Dyna.

Source: VSI / TU Graz
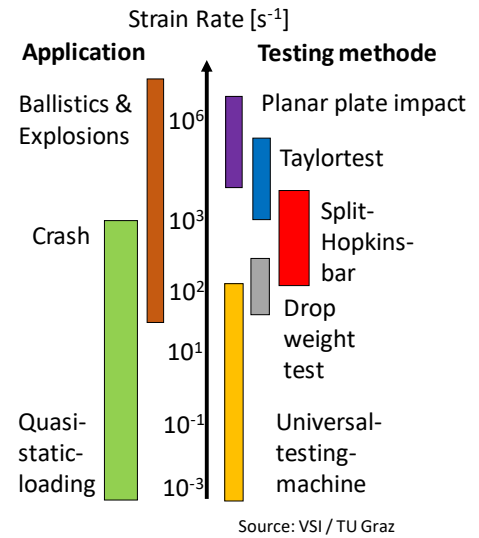
Tasks

- **Get familiar** with glass fiber reinforced composites and mechanical testing under varies strain rates as well as with explicit FE – Analyzation.
- **Plan and conduct** experimental characterization tests on small material samples.
- **Evaluate** the obtained test data for further use in a material model.
- **Validate** an already existing material card with the prepared strain rate data.

Literature

- Ninan L., Tsai J., Sun C.T. (2001). Use of split Hopkinson pressure bar for testing off-axis composites. International Journal of Impact Engineering 25 (2001) 291-313. https://doi.org/10.1016/S0734-743X(00)00039-7

- Hosseinzadeh R., Shokrieh M. M., Lessard L. (2006). Damage behavior of fiber reinforced composite plates subjected to drop weight impacts. Composites Science and Technology 66 (2006) 61-68. https://doi.org/10.1016/j.compscitech.2005.05.025

Recommended as

- Master thesis for Mechanical Engineers

Organizational

- Start: anytime
- Scholarship or part-time employment as an intership student at Mubea Carbo Tech
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