

# Einladung zum Seminarvortrag im Aachener Mechanik & Statik Kolloquium

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Fakultät für Bauingenieurwesen | Gebäude 2130 | 2. OG, Raum BS 218

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## „Elastomers under high strain rate loading: Constitutive modeling and applications“

In this talk, I present our efforts in understanding and modeling of solid elastomeric polyureas, in particular under high strain rate loading conditions. The time-dependent behavior of elastomers affects almost all of their entire mechanical performance portfolio. In recent years, the toughness of elastomeric materials has expanded this range to blast and impact protection and cavitation erosion resistant coatings, among other applications. We have evaluated the mechanisms of energy absorption, redirection, and dissipation in elastomeric media using a time- temperature-, and pressure-dependent nonlinear visco-elastic constitutive law. This enhanced energy absorption suggested the potential for use of such coatings in other extreme loading environments, e.g. cavitation erosion.

To summarize, the time-temperature mastercurves of visco-elastic moduli are constructed using extensive DMA data. The results are compared with high frequency ultrasonic measurements. Furthermore, the effect of hydrostatic pressure on the dynamics of polymer is evaluated, with particular attention to its modification of glass transition temperature. The high strain rate split Hopkinson bar data and pressure-shear plate impact tests are compared with the numerical results of a simple umat. Finally a simple qualitative model of progressive damage in cavitation erosion environments is discussed.

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