



Karlstad Applied Analysis Seminar (2020)

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A look behind the curtains: Modelling of elastomers

Abstract

In mechanical and automotive engineering, elastomer materials are required for components that are subjected to extreme mechanical stress and are resistant to temperature and chemicals. Typical examples are tires, toothed belts and V-belts, engine and unit mounts, air springs and chassis bushings, as well as statically and dynamically loaded seals. The requirements in terms of reliability and durability are particularly high, especially in connection with the highly sensitive, safety-relevant functions of the components. Simulation models are becoming increasingly important, particularly in the context of digitization in production. Many processing steps in the manufacture of elastomer components, beginning with mixing, rolling and extrusion or injection molding, through vulcanization, influence the final mechanical properties. In the course of their service life, these properties change due to thermo-oxidative aging, so that even lifetime predictions become a challenge. The reliable generation of "digital twins" for elastomer components thus requires a description of many effects, some of which are coupled with each other. This lecture offers insights into different modelling approaches of individual stages of the life of elastomers