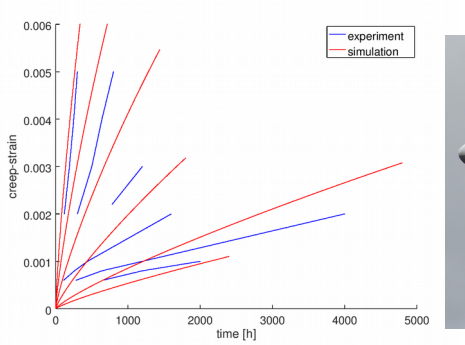
Physics-based crystal plasticity model of nickel based superalloys

Since the mid 1940s, jet engines have pushed the boundaries of high temperature materials to service conditions of up to 1100°C and mechanical loads in excess of 100MPa. The state of the art material in such conditions are nickel based superalloys. Nonetheless, even superalloys slowly degrade and deform plastically in use. The complex deformation behaviour has been subject of research throughout the last 60 years, but a general crystal plasticity material model is still missing.

The project involves the calibration and refinement of an inhouse crystal plasticity material model at different temperature and stress levels. Versatile material models are helpful in the design process of superalloys. Optimization most often leads to more efficient engines, which reduces CO_2 emissions.



Nimonic90 at 650°C at different uniaxial stresses

A320neo
(Source wikimedia)

Ansprechpartner:

Lukas Munk
Appelstr. 11 / 5. Etage
munk@ikm.uni-hannover.de
0511-762-17571

Voraussetzungen:

Interest in finite elements and programming

Termin:

ab 19.02.18 oder später

Institut für Kontinuumsmechanik