

Communication

Unnoticed aspects of Nadai's theory for the axial compression and deformation of cylinders of a viscous substance

Frank Richter

Institute for Materials, Department of Mechanical Engineering, Ruhr-Universität Bochum, Universitätsstrasse 150, 44780 Bochum, Germany

Hans-Jürgen Hoffmann¹

Institut für Werkstoffwissenschaften und -technologien: Glaswerkstoffe, Technische Universität, Englische Strasse 20, 10587 Berlin, Germany

Manuscript received 4 December 2006

Revision received 5 September 2007

Manuscript accepted 11 September 2007

A theory of Nadai has often been used in the literature to calculate the internal stress distribution in cylindrical bodies of viscous substances while they are being deformed into a barrel-like shape ('barrelling') under an axisymmetric compressive stress on the end plane. Several inconsistencies are demonstrated which seem not to have been noticed to date. Accordingly, the 'hot tensile strength' of glasses cannot be quantified analytically using the theory of Nadai and thus data published in the recent literature must be questioned.
