

## **DIRECT METHODS AND CONSTITUTIVE MODELING FOR PLASTIC DESIGN BY ANALYSIS**

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### **ABSTRACT**

Modern engineering design standards show the trend of replacing stress assessment with the analysis of the limit states of structures. These direct methods aim to compute the bearing capacity or ultimate load of structures without resorting to incremental plastic analysis.

Structural design codes recommend perfectly plastic limit and shakedown analysis as a direct route to design. However, research has extended the application of limit and shakedown to advanced material models such as hardening, continuum damage or gradient plasticity. The greatest benefits may be observed for thermally loaded structures below the creep range. For this important application the temperature dependency of some material parameters poses an open problem of the current research. Efforts have been concentrated on the development of nonlinear optimization methods which can solve large scale FEM discretization of industrial problems. Many different optimization methods have been proposed and successfully applied. This supports effective applications in structural optimization or structural reliability.

The minisymposium is a platform for researchers to exchange recent achievements and a chance for industrial engineers to obtain first-hand information on nonclassical limit and shakedown analyses. These may be important if the classical design limits are too restrictive. Applications that make use of direct methods are also welcome in this mini-symposium.