STATIK DYNAMIK

RUB

NUMERISCHE METHODEN IN DER STRUKTURMECHANIK

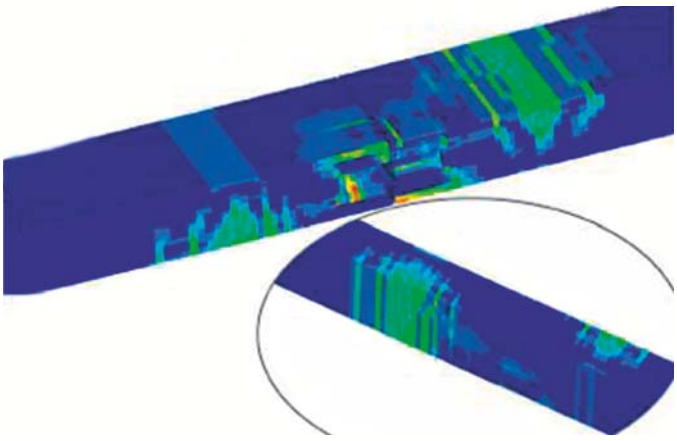
Investigation of the Load Bearing Behavior of a new Coupling for Tunnel Tubbings

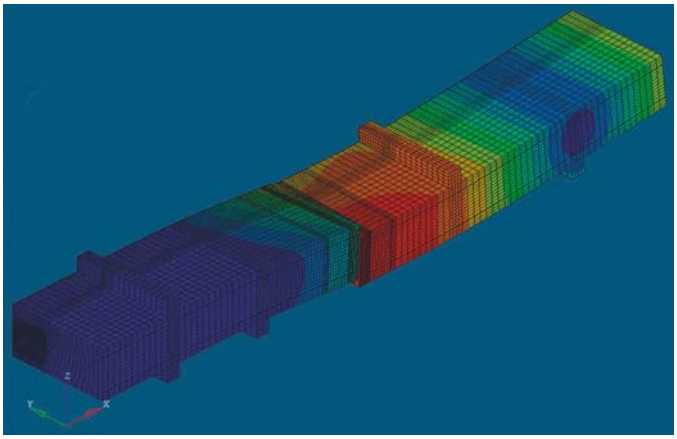
B.Sc. Maria Gafaro

Am: 05.11.2010
Um: 14:00 Uhr
Im: IA 6/21

Abstract:

In order to avoid the usage of temporary constructive steel frames, Züblin has been working on the design of a new supporting system for openings in tunnel linings; it is a high-performance coupling system for tubbings. One model of this new coupling system was built and tested in the laboratory. Its response exceeded the expected peak load by far in the laboratory test.





Based on that, a finite element model was carried out to simulate the experiment. The main goal of this simulation was to get a better understanding of the coupling system mechanical behavior. It was calculated with two different finite elements programs; Tochnog and Abaqus. Moreover the concrete was calculated with two different material models as well; the material constitutive subroutine developed by Züblin (UMAT) and the concrete damaged plasticity theory provided for Abaqus.

First, the two concrete constitutive law were calibrated and tested with a single element calculation. It was done through an iterative process both constitutive laws until they were equivalent. After that, simulation concepts were tested with the calculation of a simpler reinforced concrete structure. Finally coupling system was calculated with different discretization. Results were analyzed and compared with experimental results.