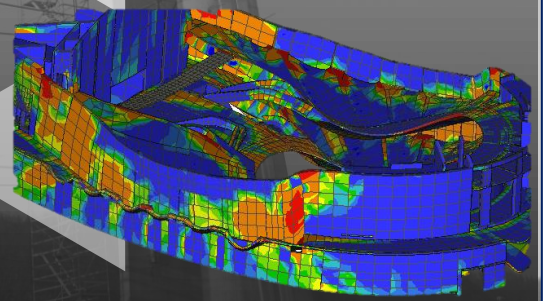
1st On-Campus Seminar

MODELS FOR NONLINEAR ANALYSIS OF CONCRETE STRUCTURES



Wednesday,
15th of September 2021.
12:00 PM - 01:00 PM (KSA)
Location: Prince Sultan Hall

Dr. Cervenka, Jan

Cervenka Consulting Prague,
Czech Republic,
www.cervenka.cz

Corporate Associates

ČERVENKA CONSULTING
Concrete Engineering & Software Solutions

Materials Structures
RESEARCH LABORATORY

CE | كلية الهندسة
COLLEGE OF ENGINEERING

جامعة الامير سلطان
PRINCE SULTAN UNIVERSITY

Riyadh (KSA), 2021/2022

ABOUT THE SPEAKER

Dr. Cervenka, Jan

Cervenka Consulting Prague,

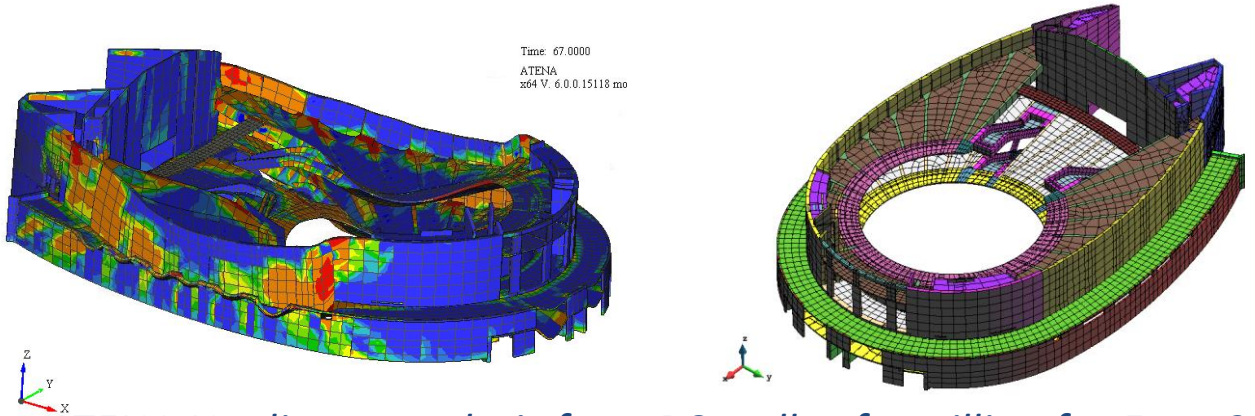
Jan Cervenka is one of the key partners in Cervenka Consulting, where he is involved in the development of ATENA software and various consulting and research projects in the area of computational modelling of reinforced concrete structures. He received his Ph.D. at the University of Colorado in Boulder in U.S.A in 1994. In his career, he worked on many consulting projects involving computational modelling and nonlinear analysis for international clients such: U.S. Army Corps of Engineers, Ishikawa Harima Heavy Industries, AREVA, Oriental Construction Company, Hilti, Olsen Engineering, Hochtief and many others. Cervenka Consulting provides software, consulting services and research in the area of modern and advanced computational methods for the simulation of real structural behaviour. The company is devoted to transferring these modern analytical methods to the engineering practice.

ABSTRACT

A modern engineer designs beautiful and challenging structures, where the classical design methods are often extended far beyond their originally envisioned application domain. Also new materials or construction technologies are appearing almost every day, while the necessary design standards take many years to develop and to mature. Engineers verify and check their design by computer simulation in these increasingly common situations. This trend is greatly supported by the rapid increase in the computational power as well as its declining cost. The seminar will present the mathematical models for modern nonlinear analysis of concrete and reinforced concrete structures. The presented material model for concrete is based on plasticity formulation combined with the orthotropic smeared crack model. Reinforcement is modelled using the embedded approach that is extended by slip degrees of freedom to enable the modelling of bond failure. The model takes into account also reinforcement corrosion for life-cycle analysis. The presentation will show the model performance on selected validation problems and on the examples of successful case studies from research as well as design practice. Among others the following case studies will be presented: results from international prediction competitions, analysis of reinforced concrete as well as pre-stressed bridges, analysis of nuclear containments, anchoring technology and probabilistic and reliability assessment of bridges.

ACKNOWLEDGEMENT

The presented concrete and durability models were developed during research projects ***TM01000059*** *"Reducing material demands and enhancing structural capacity of multi-spiral reinforced concrete columns" and* ***TF06000016*** *"Advanced system for monitoring, diagnosis and reliability assessment of large-scale concrete infrastructures" supported by Czech Technology Agency.*



ATENA Nonlinear analysis for a RC walls of pavillion for Expo 2020