HOT NEWS

ATENA Advanced User Seminar 2011

The regular favorite ATENA Advanced User Seminar 2011 will be held in Prague, Czech Republic in June and September, 2011. For more information and on-line registration watch our website: http://www.cervenka.cz. Starting from December you will be able to book your place through an on-line registration form.

ATENA New Version 4.2.7

we are continuously improving and developing our software ATENA, the leading solution for the simulation of real behavior of reinforced concrete structures. You can always download the latest ATENA Version 4.2.7b directly from our web site: http://www.cervenka.cz/downloads. Or you can request the instalation CD.

AmQuake - New Product

This year we have released our new product for seismic design of masonry buildings based on pushover analysis according to Eurocode 8 with Wienerberger products. Please read more at: www.amquake.eu

Only for 390 €

Our New Products

ATENA Ver 4.2.7

ATENA 4.2.7b was released in October 2010
All users with valid maintenance agreement can download the upgrade to the latest ATENA version from the Downloads section of our website.
Main changes since version 4.2.6b are:
· Updated ATENA-GiD interface and examples.
· Modified Interface strength - ellipse form of tension/shear interaction.
· Fixed bug in construction process in ATENA 3D.
· Many small fixes and changes in the kernel, AtenaWin/AtenaConsole, and in the program installer.
· New hardlock drivers included in installation: Hasp 5.86.
· Updated Manuals.

We are already preparing the next version, ATENA 4.2.8, to be released at the end of this year. The expected improvements and fixes:
· New graph in AtenaWin.
· Updated ATENA-GiD interface.
· Automatic check if an update is available for download.
· Czech texts which have slipped into the english version of ATENA 2D replaced with english.

FUTURE DEVELOPMENT: We are working on the 64bit version of ATENA kernel, to allow more than 2GB of RAM during analysis. We are also working on parallel processing based on multithreading in the most computationally intensive parts of the kernel, which allows an efficient exploitation of multi-core processors.

AmQuake

AmQuake program allows European engineers to design safe masonry buildings in seismic regions in accordance with the latest European standards and modern seismic assessment methods. The introduction of Eurocode 6 and 8 in March 2010 in the European community requires to verify almost all new masonry buildings for seismic safety. In the future, this will guarantee safer buildings for the population, but introduces higher demand on engineers today.

Engineers can directly import a building plan from their favourite CAD program. AmQuake automatically generates a numerical model, using the equivalent frame approach. Material properties are assigned using a database of Wienerberger masonry products and Eurocode concrete or reinforcement properties.
AmQuake automatically performs the necessary safety checks for seismic design as well as the verification for static loads. It is based on the pushover analysis according to Eurocode 8 and offers potential to exploit a higher load-carrying capacity. More at

ATENA Advanced User Seminar 2010

Our traditional user seminar in September 2010 was oriented towards advanced applications with ATENA Science, such as creep, dynamic, and fire analyses. The last section of the three-day seminar was devoted to solving user problems and to the presentation of interesting ATENA applications. In the following, an interesting user project is described:

In 2006, a railway bridge in Örnsköldsvik, Sweden has been strengthened with CFRP and tested up to failure. Preliminary calculations by ATENA and other FE Software have already been conducted within the frame of Sustainable Bridges project, both before and shortly after the test [1]. Now we would like to present the results of the three dimensional model developed in ATENA Engineering 3D by Gabriel Sas and his colleagues at the Lulea University of Technology.

[1]http://www.sustainablebridges.net/main.php/SB7.3.pdf?fileitem=12550196

The loaded span has been meshed with volume elements, for the other span, a coarser mesh of shell elements has been used. The most important reinforcement has been modelled with discrete bars, the rest by smeared reinforcement. In the Load-Displacement graph you can see how close are the analysis results to the measured response. You can also compare the calculated crack pattern with the final shear crack.

Calculated crack pattern

The test setup

Final shear crack
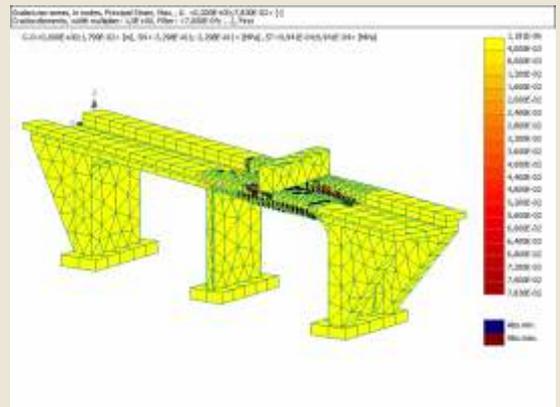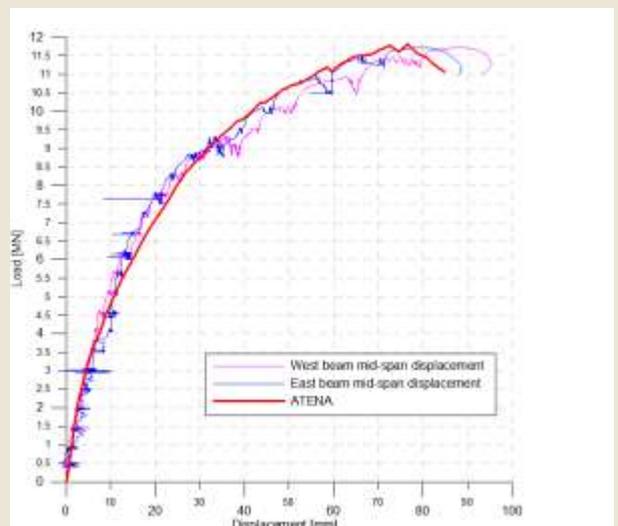
ATENA Simulation of the
Ö-vik Bridge Full-scale Test

Our Publications in 2010

Material Model for Finite Element Modelling of Fatigue Crack Growth in Concrete
Pryl Dobromil, Cervenka Jan, Pukl Radomir
Conference Fatigue 2010, Praha, Czech Republic

The three-dimensional fracture-plastic model in the finite element software ATENA has been extended to capture fatigue damage in tension (however, the model can be easily modified to also consider damage from compressive and tensile-compressive loads). The damage can result in new cracks or growth of existing ones. http://www.fatigue2010.cz

On the Uniqueness of Numerical Solutions of Shear Failure of Deep Concrete Beams: Comparison of Smeared and Discrete Crack Approaches
Jan Cervenka, Vladimir Cervenka
Euro-C, Conference 2010, Schladming, Austria

Numerical modeling of shear failure of reinforced concrete beams with or without shear reinforcement still remains a challenging task even after several decades of active research. The paper concentrates on the shear failure analysis of large beams without and with shear reinforcement. As an example, it uses the experiments performed by Collins and Yoshida (2006). The paper discusses the main issues affecting the reliability of shear strength predictions and will evaluate the effectiveness of the discrete and smeared crack approaches in resolving the numerical problems in shear failure modeling of strain softening materials.

Multi-Scale Modelling of Concrete Degradation such as Efflorescence and Laitance
L. Jendele, I. Smid, J. Cervenka
10th Int. Conf. on Comp. Struct. Tech., Athens, Greece

The paper is concerned with efflorescence and laitance on concrete. The main reasons for efflorescence creation are discussed together with ways for their removal, reduction and/or remediation. A number of recent relevant publications are discussed. The second part of the paper develops a model for analysis of moisture transport in concrete structures. A full model containing both water convection and water vapour diffusion is developed. A simplified version of the model is also provided. The model depends on experimentally obtained constitutive equations. It is implemented in ATENA software that is also used in the presented sample analysis.

Advanced tools for numerical analysis and life-cycle assessment of reinforced concrete structure
Radomir Pukl, Vladimir Cervenka, Bretislav Teply, Drahomir Novak, Alfred Strauss, Konrad Bergmeister
IALCE Conference 2010, Taiwan

Software tools for rational modeling of concrete structures, nonlinear reliability assessment and lifetime analysis are presented. The concept of virtual simulation used on the way from assessment of experimental results to reliability assessment based on monitoring data is described. The whole approach is based on randomization of nonlinear fracture mechanics finite element analysis and degradation models for reinforced and pre-stressed concrete structures. Efficient techniques for the numerical analysis and stochastic simulation methods are combined with probabilistic calculation of deterioration and material degradation in order to offer advanced tools for assessment of realistic behavior of reinforced concrete structures from reliability, durability and risk points of views. The presented tools enable to assess safety and reliability during the service life of civil engineering structures.

Safety Assessment of Nuclear Containments
Jan Cervenka, Czech Concrete Days 2010, Hradec Kralove

Design of prestressed concrete wessels for containment of nuclear reactors is verified for actions in service states as well as in accident situations. Numerical simulations based a nonlinear finite element analysis are typically used for this pupose. Authors are involved in projects of several power plants and developed a range of efficient tools for this purpose. Presented examples include design of new as well as investigation of existing containments. In case of project of NNP Olkiluoto 3 in Finland simulations of prestressed containment and steel liner were performed under service and severe accident loading conditions. In Indian research center BARC a model containment structure is tested to failure. Author participated in this bench mark project to predict behaviour of containment and its failure mode. Existing structure of the old containment in Crystal River, Florida, was investigated for delamination damage during reconstruction.

Numerical Simulation as a Design Tool for Reinforced Concrete
Vladimir Cervenka, Jan Cervenka,
6th CCC Congress Marianske Lazne 2010

The numerical simulation based on non-linear analysis represents an innovative tool for verification of limit states in design of concrete structures. Two types of limits states are addressed in the paper: Assessment of global safety of large shear beams and deflections of RC beams. The authors examined performance of several available methods for assessment of global safety of ultimate limit states and proposed safety formats, which are in agreement with general reliability requirements. The present study extends the range of failure modes to large beams with brittle shear failure where the size effect is important. In the second part a verification of deflections by numerical simulation is compared with code methods and validated by experiments.

Shear failure of large lightly reinforced concrete beams: part II – assessment of global safety of resistance
Vladimir Cervenka, Jiri Dolezel, Drahomir Novak
3rd fib International Congress 2010, Washington

Global safety format is applied for verification of safety of resistance calculated by non-linear analysis for brittle model of failure. The case study is based on two experiments of large reinforced concrete beams, one without shear reinforcement and another with light shear reinforcement. Various safety formats are compared including: Global safety factor according to Eurocode 2 – for bridges; Global safety method based on estimate of coefficient of variation (ECOV method); Full probabilistic analysis; Partial safety factor method. In all methods the resistance is calculated by non-linear finite element method. Results compare design resistance obtained by various methods. The study confirms that the shear resistance of large beams can be well simulated by nonlinear analysis, while it is significantly underestimated by conventional methods.

ČERVENKA CONSULTING

Past Events, Exhibitions and Presentations

ATENA Advanced User Seminar

CVUT Prague,
Faculty of
Civil Engineering
September 8-10, 2010

1st International Workshop Design of concrete structures using EN 1992-1-1

CVUT Prague
September 16-17, 2010

CCC 2010, 6th Central European Congress on Concrete Engineering,

Casino Center
Marianske Lazne
September 30 -
October 1, 2010

IALCCE2010, Second International Symposium on Life-Cycle Civil Engineering

National University of
Science and Technology
Taipei, Taiwan, October 27-31, 2010

Where You Can Meet Us

17th Concrete Days (CZECH REPUBLIC) Hradec Kralove, November 23 - 24, 2010

ATENA software will take part in the traditional exhibition during the Czech Concrete Days, which has built an exclusive position among domestic events in this field due to its professional level, range of program and even a rich social part that enables an exceptional opportunity to meet before the end of the year. We will participate at the Exhibition CONCRETE 2010 in the ALDIS Congress Centre in Hradec Kralove and present two papers and a poster.

fib Symposium PRAGUE 2011, CONCRETE ENGINEERING FOR EXCELLENCE AND EFFICIENCY (CZECH REPUBLIC), June 8-10

Jan Cervenka, Vladimir Cervenka, and Radomir Pukl from Cervenka Consulting will present their papers on the technical conference and you are also welcome to visit our exhibition stand.

SYMPOSIUM THEME
- New Model Code – expected impacts and practice of use. Experiences with New Model Code clauses in the field of design, analysis, and execution of concrete structures. Expected improvements, and new areas of interest.
- Concrete and construction technology – transfer of experience. Advanced types of concrete and reinforcing materials. Research results and their application in structural engineering. Progressive technologies of construction.
- Modelling and design of outstanding and innovative structures. Numerical methods and their application in modelling and design procedures. Design of remarkable and non-traditional concrete structures in illustrative examples. Innovative structural systems.
- Structures integrated into environment in a balanced way. Interaction of concrete structures and environment with respect to context. Sustainable structures. Structural concrete as a natural material suitable for structures being friendly to environment.
- Combination of structural concrete with other materials. Composite and hybrid concrete structures exhibiting favourable concrete properties in structural performance. Interaction of concrete with other materials – problems, analysis, structural arrangements, detailing.