

1. TRAINING AND NEW PRODUCTS

ATENA Advanced User Seminar on September 8-10, 2008

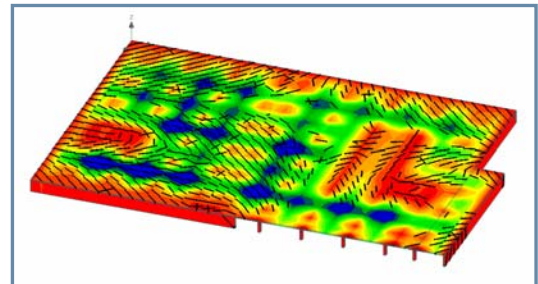
ATENA Advanced User Seminar is taking place in Prague, Czech Republic on September 8-10, 2008. The seminar is targeted for advanced ATENA users, who want to learn more about the theoretical background of ATENA and its advanced application areas such as ATENA 3D, GiD-pre-post/processing, dynamic, eigenvalue, creep, thermal or fire analyses. This time the seminar will strongly focus on the features of the new ATENA version 4, which will be released this summer. The main focus will be on the new package ATENA - Science, which includes a new and robust GiD interface and supports new analysis types such as nonlinear dynamic and eigenvalue analysis. It is recommended to register as soon as possible as the number of participants is limited. Please, register by email by filling in the form below and sending it to the address cervenka@cervenka.cz. Details, program, and the registration form can be found in the PDF document [ATENA ADVANCED USER SEMINAR 2008.pdf](#) on our website.

ATENA Program Version 4

The new version will be released in September 2008, and it will include many exciting and new features:

The new ATENA will be distributed in two versions:

ATENA Engineering – is suitable for the static nonlinear analysis of structural elements. It uses our standard and user-friendly graphical interface. It is an excellent tool for checking reinforcement detailing, verifying crack widths or checking the ultimate load carrying capacity of structural elements.



Example of deflections and cracks obtained for floor slab in underground garage.



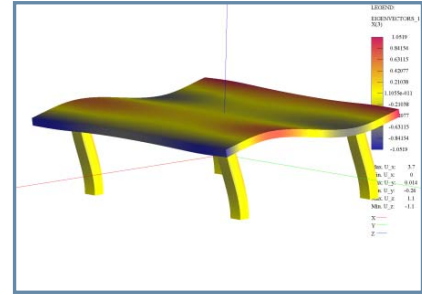
Model of prestressing cables in a nuclear containment vessel.

ATENA Science – covers broad range of material behavior in time. It is suitable for analysis of complex structural analysis problems, such as:

- ◆ Dynamic implicit analysis
- ◆ Eigenvalue analysis
- ◆ Static stress analysis
- ◆ Creep analysis
- ◆ Transport of heat and fluids,
- ◆ Fire analysis

More about the New Features in ATENA Science

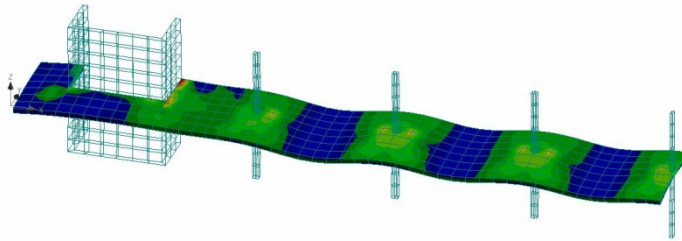
Dynamic implicit analysis – a totally new feature in ATENA version 4. It is available only in ATENA Science with GiD preprocessor. The implicit algorithm is based on Newmark's scheme including the Hughes alpha method. The new dynamic feature can be used for earthquake simulations as well as for various vibration problems.



Eigenform of a slab structure

Creep analysis – in ATENA Science it is possible to perform time dependent creep analysis using advanced creep models such as for instance the B3 model of Bazant. This feature is suitable for bridge analysis where ATENA can easily simulate the construction process, cracking, creep as well as shrinkage.

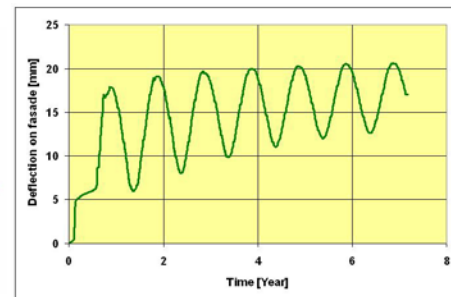
Temperature analysis – this option is also available only in ATENA Science. It can be combined with the static or creep analysis. The calculated transient temperature field can be imported into the static or creep analysis. In the creep analysis the temperature field influences the concrete shrinkage. In the static stress analysis the material properties can be dependent on the calculated temperature field thus it is possible to simulate the structural response under high temperature.



Creep analysis of a floor slab.

Left: Deformed shape with iso-areas of crack width after 7 years.

Right: Deflection development in time under actions of permanent load and environment temperature cycles ± 20 °K (Courtesy Büro Bergmeister)



Please do not hesitate to contact us if you want to learn more about the new ATENA version and how it can help you in your work.

2. OUR CURRENT PROJECTS

Nuclear Containment in Finland

Cervenka Consulting is performing nonlinear analysis by ATENA of the prestressed concrete containment vessel for the Olkiluoto 3 nuclear power plant in Finland as a subcontractor of [AREVA](http://www.aveva.com), world energy expert and supplier of technological solutions for highly reliable nuclear power generation and electricity transmission and distribution. The analysis includes all required loading scenarios including normal service conditions and accident actions.



Olkiluoto 3 nuclear power plant in Finland

Sustainable Bridges

In 2007 we have successfully completed our participation in a European research project Sustainable bridges <http://www.sustainablebridges.net>, which developed and proposed new methods for the assessment of existing railway bridges. Within the framework of this project we have proposed new safety formats for the application of nonlinear analysis in the engineering practice. More details can be found in our paper **Probabilistic Estimate of Global Safety Factor – Comparison of Safety Formats for Design based on Non-linear Analysis** (look at our website, section papers).

3. OUR RECENT PUBLICATIONS

Three Dimensional Combined Fracture–Plastic Material Model for Concrete

Jan Cervenka, Vassilis K. Papanikolaou

This paper describes a combined fracture–plastic model for concrete. Tension is handled by a fracture model, based on the classical orthotropic smeared crack formulation and the crack band approach. It employs the Rankine failure criterion, exponential softening, and it can be used as a rotated or a fixed crack model. The plasticity model for concrete in compression is based on the Mene'trey–Willam failure surface, the plastic volumetric strain as a hardening/softening parameter and a non-associated flow rule based on a nonlinear plastic potential function. Both models use a return-mapping algorithm for the integration of constitutive equations. Special attention is given to the development of an algorithm for the combination of the two models. The suggested combination algorithm is based on a recursive substitution, and it allows for the two models to be developed and formulated separately. The algorithm can handle cases when failure surfaces of both models are active, but also when physical changes such as crack closure occur. The model can be used to simulate concrete cracking, crushing under high confinement and crack closure due to crushing in other material directions. The model is integrated in a general finite element package ATENA and its performance is evaluated by comparisons with various experimental results from the literature.

To be published in International Journal of Plasticity, Elsevier, 2008, doi:10.1016/j.ijplas.2008.01.004

Global Safety Format for Nonlinear Calculation of Reinforced Concrete

Vladimir Cervenka

The safety format suitable for design of reinforced concrete structures using non-linear analysis requires a global approach. The performance of various safety formats is compared on four examples ranging from statically determinate structures with a bending mode of failure up to indeterminate structures with a shear failure.

Beton- und Stahlbetonbau 2008: Sonderheft engl. Nr. 10117

Advanced Life-Cycle Analysis fo Existing Concrete Bridges

Alfred Strauss, Konrad Bergmeister, Simon Hoffmann, Radomir Pukl, Drahomir Novak

A complex interdisciplinary approach to the reliability assessment of reinforced concrete structures is introduced and demonstrated on a real existing bridge structure. The reliability index of the structure decreases during its life cycle due to material degradation. A retrofitting to the desired reliability level should be performed. This procedure is modeled by advanced life-cycle computer simulation. The main feature of the presented approach is the nonlinear finite-element analysis of the structure employed for the realistic assessment of structural behavior. A suitable technique of statistical sampling, which allows a relatively small number of simulations, is used in this context. Analytical deterioration models combined with i situ monitoring are used to launch the degradation process. The presented methodology for advanced life-cycle analysis is integrated in the innovative decision-making tool that supports maintenance planning of engineering structures.

Journal of Materials in Civil Engineering © ASCE, January 2008/9

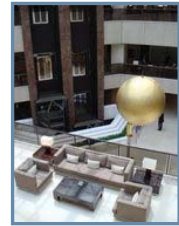
4. WHERE YOU CAN MEET US?

In the near future it is possible to visit our representatives at the following events and exhibitions. There you can learn about our new products and services.

9th International Conference on Computational Structures Technology

Athens, Greece, September 2nd-5th, 2008

Our colleague Mr. Libor Jendele will present his paper **Modelling of Concrete Fracture and Damage Due to High** in the technical program of the conference. For more information look at the website <http://www.civil-comp.com/conf/cst2008.htm>



Athenaeum International Hotel

Atena Advanced User Seminar on September 8-10, 2008

Prague, Czech Republic, September 8-10th, 2008

8th International Symposium on Utilization of High-Strength and High-Performance Concrete

Tokyo, Japan, October 27-29th, 2008

Japan Concrete Institute (JCI), Japan Prestressed Concrete Engineering Association (JPCEA) and Federation Internationale du Beton (fib) are pleased to announce the 8th International Symposium on Utilization of High-strength and High Performance Concrete to be held in Tokyo in October 2008. The symposium will bring together engineers, designers, researchers and scientists from around the world to promote better understandings on common interests ranging from the most recent researches to the latest applications of high-strength and high performance concrete for construction. You can find more information about Academic and Social Program, Technical Exhibiton etc. on the web <http://www.jci-web.jp/8HSC-HPC>

6th International Probabilistic Workshop

Darmstadt, Germany, November 26-27th, 2008

15th Czech Concrete Days 2008

Hradec Kralove, Czech Republic, Noveber 27-28th, 2008

The Czech Concrete Society with co-operation CBS Service organize 15th Concrete Days 2008 in Congress Centre Aldis in Hradec Kralove in November 2008. Concrete Days are traditional sectional and balance action of the most monumental concrete constructions in Czech Republic and in abroad and of the important novelties in the branche of proposing and implementation concrete constructions during elapsed year. You can find more information about Technical and Social Program, Technical Exhibiton at the website <http://www.cbsbeton.eu/en/betonarske-dny-2008>



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