

JCSS Newsletter

2014/15



Background and General Information

General activities of the JCSS

The main aim of the JCSS is to support the engineering associations of the Liaison Committee (CIB, ECCS, fib, IABSE and RILEM).

The tasks of the JCSS involve pre-normative work and development of guidelines, hereunder:

- The JCSS Probabilistic Model Code (PMC)
- Assessment of existing structures
- Guidelines for Risk Assessment
- Targeted workshops and special sessions at conferences
- Defining and initiating joint research projects

A number of members participate in code committees in order to assist in bringing new ideas into practice. This holds in particular for ISO and Eurocode.

Present organization

Leadership:

- President J.D. Sørensen
- Previous President M.H. Faber

Board members:

- | | |
|------------|------------------|
| • IABSE | N.P. Høj |
| • CIB | G. Canisius |
| • fib | L. Taerwe |
| • RILEM | Kefei Li |
| • ECCS | vacancy |
| • IASS | vacancy |
| • JCSS WP1 | T. Vrouwenvelder |
| • JCSS WP2 | I.B. Kroon |

Membership of the JCSS

Currently there are 70 members in the JCSS covering most geographical parts of the world. Not all members are active and presently 40 participate as corresponding members. New memberships are based on personal interest and commitment, recommendations and scientific/professional credentials. Usually new members are linked to specific, defined activities (e.g. a new section in the PMC). It is as a general rule expected that members participate at least at one of the two biannual meetings of the JCSS.

Examples of previous outreach activities

Conducted targeted workshops with JCSS as organizer or co-organizer

- Wind actions in codes, looking for hidden safety, Workshop in cooperation with Eurocode TC250/SC1, Actions on Structures, February 2015, Delft
- Risk and reliability based assessment of existing structures in the framework of the Eurocodes. October 1-2, 2014, Ghent University, Belgium, see report below.
- Symposium on 'Society-Wide Life Safety and Health Management', August 11-13, 2014, Copenhagen, see report below.
- Life Quality Index Symposium. August 21-23, 2012, Copenhagen.
- Summer school on 'Robustness of structures', July 2-6, 2012, Ohrid, Macedonia. Organized together with IABSE in connection with the COST project 'Robustness of structures'.
- Risk-Based Decision Making for Temporary Structures and Activities, International Forum on Engineering Decision Making: Sixth Forum, Lake Louise, Canada, January 26-29, 2012.
- Technical session on Robustness (COST) at the IABSE 'International Symposium on Bridge and Structural Engineering', London, September 20-23, 2011.
- 11th International Conference on Applications of Statistics and Probability in Civil Engineering, ETH Zurich, Switzerland, August 1-4, 2011, www.icasp11.ethz.ch.
- Semiprobabilistic FEM Calculations, Delft, The Netherlands, December 1-2, 2009.
- Structural Robustness, Stanford University, Stanford, USA, October 28, 2008.
- Risk Acceptance and Risk Communication, Stanford University, Stanford, USA, March 26-27, 2007.
- Robustness of Structures, BRE, Garston, Watford, UK, November 28-29, 2005.

Initiated joint research projects

- COST TU0601, Robustness of Structures, <http://www.cost-tu0601.ethz.ch>, completed 2011.
- COST TU1402, Quantifying the value of structural health monitoring, kick-off 2015.

News from the working parties

Working party 1: Probabilistic Model Code (PMC)

New sections on Masonry, Fatigue and Thermal actions have been uploaded Work is going on for the development for a new robustness annex as well as for the action section on environmental attack.

A first draft for the document on explosion load has been made and one on traffic loads is in the planning Developments for the modeling of the material properties for glass are carefully traced. A workshop in the second half of 2015 is envisaged.

Already for quite some time the Working Party want to write a document on reliability based nonlinear structural analysis. Important questions are: what types of nonlinear analysis can be distinguished? An analysis may be geometrically or physically nonlinear or both. Physical nonlinear analysis may be based on plastic material models, including hardening or softening, but also on cracking. Deformation capacity may explicitly or implicitly play a role. In all those cases model uncertainties should be defined. The definition should enable at least a theoretical possibility for measurement. Given the models the next question is how to perform the calculations. FEM calculations may be an option, but also other options might be considered. Finally both probabilistic and semi probabilistic (partial factors) calculation procedures should be considered.

Working party 2: Risk Analysis and Risk Management

WP2 is working with specification of design basis for temporary structures and activities. This is motivated by what seems to be an overrepresentation of accidents with temporary structures and activities. Risk evaluation principles and suggestions for new practices is another focus area including both more sophisticated lifesaving costs principles and more generalized risk evaluation principles.

During the past WP2 has focused on preparing a brand new document on the principles and fundamentals of risk assessment of structural systems and engineering infrastructure. This document can be downloaded from http://www.jcss.byg.dtu.dk/Publications/Risk_Assessment_in_Engineering.aspx. This document contains several novelties, particularly with respect to system interpretation, consequence modelling, robustness, and holistic/sustainable decision making.

Recent meetings

- 54th JCSS Meeting, Edinburgh, UK, October 5, 2012 organized by D Val.
- 55th JCSS Meeting, Darmstadt, Germany, March 7-8, 2013 organized by A Graubner.
- 56th JCSS Meeting, New York in connection with ICOSSAR, June 15, 2013.
- 57th JCSS Meeting, Munich, Germany, January 16-17, 2014 organized by D Straub.
- 58th JCSS Meeting, Gent, Belgium, October 2-3, 2014 organized by R Caspeepe and L Taerwe.
- 59th JCSS Meeting, Zurich, Switzerland, January 15-16, 2015 organized by B Sudret.

Activities in planning

New focus areas

Probabilistic modelling of natural hazards and natural hazards risk management As a logical extension of the work of the JCSS in the past and the extended focus in the international society on global climate changes it is envisaged that the JCSS in the coming years will specifically address the issues related to the probabilistic modelling of the performance of the built environment in regard to natural hazards and the management of the related risks.

Workshops and other events

For the coming period the JCSS is sponsoring and planning the following workshops and events:

- Workshop on 'Calibration of partial factors for climatic loads' in February-March 2015
- Workshop on 'Glass' in Delft, autumn 2015
- Short course on JCSS PMC in connection with IABSE conference Geneva, 23-25 September 2015
- Session on 'Structural safety and risk assessment' at IABSE conference Geneva, 23-25 September 2015
- Workshop on 'Ship collisions' in Copenhagen in January 2016
- Symposium on 'Fire risk and stochastic modeling', 2016
- Conference segment on 'Reliability and Safety' Lyngby, Denmark, 21-24 August 2016 in connection with the RILEM conference, Copenhagen, 2016
- JCSS Course on 'Probabilistic Methods in Engineering', Lyngby, Denmark, 15-19 August 2016 in connection with the RILEM conference, Copenhagen, 2016

Courses

JCSS is developing three new courses within 'JCSS Continuing Education & Advanced School':

- Probabilistic Modelling and Risk Analysis in Engineering
- The JCSS Probabilistic Model Code
- Risk Informed Decision Making and Decision Analysis

The courses are planned to start in 2015.

Next meetings and events of the JCSS

- 60th JCSS Meeting, July 2015 – in connection with ICASP
- 61st JCSS Meeting, January 19-20, 2016, Copenhagen (I Kroon)

JCSS Workshop, 1-2 October 2014, Ghent, Belgium "Risk and reliability based assessment of existing structures in the framework of the Eurocodes"

Prior to the autumn JCSS meeting, a JCSS workshop was held on October 1-2 in Ghent (Belgium) at the Department of Structural Engineering of Ghent University. During this workshop, focus was given to risk and reliability based assessment of existing structures. Although probabilistic methodologies are commonly available to assess the structural safety of existing structures, a practically applicable codified approach accessible for engineering practitioners is needed. Further, still several questions arise when looking at the applicability and compatibility of assessment procedures with respect to the current structural Eurocodes as well as with respect to target reliability levels for inspections and interventions.

During the workshop 20 presentations were given, dealing with several aspects related to the workshop topic on assessment of existing structures, more specifically dealing with full-probabilistic reliability assessment and monitoring based updating, the analysis of uncertainties and model uncertainties which are involved, the development of partial factors to come to a semi-probabilistic assessment approach and the risk acceptance based determination of target reliability levels.

The overall aim of this workshop was to bring together experts in this field and to assemble novel research and practical expertise with respect to the assessment of the structural performance of existing structures with or without damage and/or revised operational requirements, all with respect to their intended remaining service life. In total 40 people participated in the workshop, covering a diversified expert group. During the workshop several pending questions have been discussed and have indicated further research needs. Further, as an outcome of the workshop a special issue of Structural Concrete is under preparation.

“Society-Wide Life Safety and Health Management” An International Symposium, Technical University of Denmark August 12 –13, 2014

Protection of its citizens constitutes a primary duty for every state. Life safety and health management play a central role in public administration. Politicians must deal with many risks, risks of very different nature. To prioritize among them, as well as among options for control, metrics for estimating the magnitude and severity of the risks can be applied. Several such “life-quality metrics” (e.g. LQI, QALYs, DALYs, etc.) have been developed and applied. These metrics all aim to support decisions on the allocation of public available resources between and within societal sectors, but the methods and data used differ among disciplines.

Public life safety and health management has progressed significantly over the last decades, but with substantial and unjustifiable variability over different societal sectors. Moreover, despite the developments of central concepts within the field of health economics and preference modeling, there are significant challenges yet to be overcome before the full potential of dispassionate indicators can be realized. In this respect the interests of the public have not been served. These challenges were the focus of the symposium.

Appreciating the significance of these challenges for progress in life safety and health management at societal level, we decided to follow up on the 2012 LQI Symposium held at the Technical University of Denmark with this International Symposium on Society Wide Life Safety and Health Management. The objective was to assess the progress and the current status on metrics for measuring public life and health related risk management, addressing cross-sectorial aspects of strategic and operational management of life safety and health. Moreover, the focus was directed towards identifying barriers to rational decision making in the public management of life safety and health and to illustrate and discuss these through case studies. Finally, an important point of the symposium was to identify those issues of research and developments but also those related to dissemination and communication which should be given more emphasis in the future.

Conclusions

The state will not have discharged its duty to its citizens to provide effective protection against risks to life and health until these risks are managed rationally and consistently. The symposium served to further this goal by presenting several tools, such as the LQI, the J-value, DALYs and QALYs, and illustrating their application by practical examples.