

# REPORT

## on IAPWS-related activities: August 2011 – August 2012

submitted by the

Czech National Committee for the Properties of Water and Steam (CZ NC PWS)

to the Executive Committee Meeting of 2012 IAPWS Meeting, Boulder, USA in September 2012

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### Participating institutions

The following Czech Institutions have participated in the research of thermophysical properties and chemical processes between August 2011 and August 2012:

**Institute of Thermomechanics AS CR, v. v. i.**, (“IT ASCR”), Department of Thermodynamics,  
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**Czech Technical University in Prague** (“CTU”), Faculty of Mechanical Engineering, Department of Fluid Mechanics and Thermodynamics, and Department of Power Engineering, Technická 4, CZ-166 07 Praha

**Institute of Chemical Technology Prague** (“ICT”), Power Engineering Department (“ICT-IE”) and Department of Physical Chemistry (“ICT-IPC”), Technická 5, CZ-166 28 Praha 6

**University of West Bohemia** (“UWB”), Faculty of Mechanical Engineering, Department of Power System Engineering, Univerzitní 8, CZ-306 14 Plzeň

**ŠKODA POWER**, Plzeň, Inc., A Doosan Company, Tylova 57, CZ-316 00 Plzeň

**Technical University of Liberec** (“TUL”), Department of Chemistry, CZ-461 19 Liberec

**SIGMA Research and Development Institute** (“SIGMA”), Jana Sigmunda 79, CZ-783 50 Lutín



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## Funding

The activities described below were sponsored by the Grant Agency of the Academy of Sciences of the Czech Republic (GAAV ČR), the Czech Science Foundation (GAČR), ŠKODA POWER, Ministry of Education, Youth and Sport of the Czech Republic (MŠMT), and Ministry of Industry and Trade of the Czech Republic (MPO).



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## Board of CZ NC PWS for 2010-2013:

Dr. J. Hrubý  
Prof. R. Mareš  
Dr. T. Němec  
Prof. P. Šafařík  
Prof. J. Šedlbauer

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## List of IAPWS-Related Activities

The Czech Committee in collaboration with the University of West Bohemia organized the 2011 IAPWS Meeting in Plzeň (Pilsen). The Meeting was attended by 24 participants from the Czech Republic and they presented 12 papers [1-12].

Information about new documents adopted and authorized by IAPWS were published on the CZ NC PWS website.

The joint project of IT ASCR and UWB sponsored by the Ministry of Education, Youth and Sports of the Czech Republic provided financial support for international collaboration with IAPWS since 2009. The project support will end on 31/12/2012.

Dr. Hrubý (IT ASCR) and his collaborators studied thermodynamic properties of condensing steam flow, measured density of supercooled water at high pressures, and conducted research into thermodynamic modeling of hydrates of water-carbon dioxide mixtures [1, 8, 13-19].

Prof. Mareš (UWB) and his collaborators studied surface tension of water and other properties of water and steam [3, 20-24].

Prof. Mareš and Dr. Kalová (UWB) in collaboration with Prof. Anisimov (USA) studied thermophysical properties of supercooled water [2, 25-27].

Prof. Maršík (IT ASCR) and his research team studied problems of droplet nucleation in water and the influence of thermophysical properties of water on the efficiency of hydrogen fuel cells [6, 7, 28-30].

Prof. Šedlbauer (TUL) coordinated the IAPWS-IUPAC Joint Project entitled "Establishing recommended data on thermodynamic properties of hydration for selected organic solutes and gases" [4].

The research team at CTU continued to study wet steam energy losses in LP steam turbines (publications are in preparation).

Dr. Sedlář (SIGMA) studied the problems of bubble fission and cavitation instabilities in water turbines and pumps [31-32].

Dr. Jiříček (ICT-IE) and his collaborators studied the problem of renewable power sources and chemical effects in water and steam systems of power plants [33-35].

Dr. Hnědkovský (ICT-IPC) and his collaborators studied the properties of organic solutes in water [36-49].

Prof. Šťastný (ŠKODA POWER) and his co-workers tested and applied a numerical model of steam flow in nozzles and turbine blade cascades with NaCl binary nucleation and condensation [4, 50, 51].

### IAPWS Young Scientist Fellowships

In 2011, **Dr. Vinš** completed his IAPWS Young Scientist Fellowship Project (exchange between the Czech Republic and Germany) entitled "Development of Thermodynamic Models for Hydrates in Water – Carbon Dioxide Mixtures" jointly supervised by Dr. Hrubý and Prof. Span. The preliminary results were presented and discussed during the 2011 IAPWS Meeting in Plzeň [8]. The final Project Report will be presented during the 2012 IAPWS Meeting in Boulder. Five papers and presentations were published [15-19].

**Dr. Holten** is currently completing his IAPWS Young Scientist Fellowship Project (exchange between the Czech Republic and USA) entitled "Towards an IAPWS Guideline for the Thermodynamic Properties of Supercooled Water" jointly supervised by Dr. Hrubý, Prof. Anisimov, and Dr. Sengers. The preliminary results will be presented during the IAPWS Meeting 2012 in Boulder. One journal paper was published [25].

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