REPORT

on IAPWS-related activities: August 2013 – May 2014

submitted by the

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

to the Executive Committee Meeting of 2014 IAPWS Meeting, Moscow, Russia, in June 2014

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Participating institutions

The following Czech Institutions have participated in the research of thermophysical properties and chemical processes between August 2013 and May 2014:

Institute of Thermomechanics AS CR, v. v. i., ("IT ASCR"), Department of Thermodynamics, Dolejškova 1402/5, CZ-182 00 Praha 8

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"), Department of Power Engineering ("ICT-DPE") and Department of Physical Chemistry ("ICT-DPC"), 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

Doosan Škoda Power, Plzeň, Inc., Tylova 57, CZ-316 00 Plzeň

Technical University of Liberec ("TUL"), Department of Chemistry, CZ-461 19 Liberec

SIGMA Research and Development Institute Ltd. ("SIGMA"), Jana Sigmunda 79, CZ-783 50 Lutín

University of South Bohemia ("USB"), Faculty of Science, Branišovská 31A, CZ-370 05 České Budějovice

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Board of CZ NC PWS for 2014-2017:

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

List of IAPWS-Related Activities

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

The international collaboration with IAPWS has been sponsored by a joint project of IT ASCR and TUL sponsored by the Ministry of Education, Youth and Sports of the Czech Republic since 2013. The project support will end on 31/12/2016.

The team of Dr. Hrubý (IT ASCR) have focused on the development of thermodynamic models for gas hydrates (in cooperation with the team of prof. Roland Span from the Ruhr-University Bochum), experimentally investigated surface tension of pure supercooled water, developed an experimental apparatus for the measurement of density of supercooled water, and developed analytical descriptions of thermodynamic properties of steam and water suitable for computational fluid dynamics applications [1-7], [18-20].

Prof. Mareš (UWB) and Dr. Kalová (USB) have studied thermophysical properties of supercooled water, thermodynamic properties at atmospheric conditions, and collaborated on the development of extended equation for Region 5 of IAPWS-IF97 [8-10], [21].

Prof. Maršík (IT ASCR) and his research team have studied the problems of efficiency of hydrogen fuel cells [11], [23-24].

Dr. Němec (IT ASCR) have studied the application of the classical nucleation theory to the estimation of ice-water interfacial energy [12], [22].

Prof. Šedlbauer (TUL) and his collaborators have investigated thermodynamic properties of hydration for selected organic solutes and gases [13, 14].

Assoc. Prof. Kolovratník (CTU) and his collaborators have investigated binary homogeneous nucleation and wet-steam energy losses in LP steam turbines and developed an expansion chamber for the determination of heterogeneous particles in superheated steam in turbines [15], [25-26].

Mr. Nový (Doosan Škoda Power) and his collaborators have studied parameters of shock waves in wet steam [16], [27-29]. Mr. Nový is the chair of the IAPWS group for evaluation of the "Guideline on the Fast Calculation of Steam and Water Properties in Computational Fluid Dynamics Using the Spline-Based Table Look-Up Method (STM)".

Dr. Kysela and his collaborator have investigated water chemistry for supercritical water cooled reactors [17].

Dr. Sedlář (SIGMA) and his collaborators have studied the problems of cavitation erosion in water flows [30], and modelling of cavitation instabilities in hydrodynamic pumps [31-32]. The team is funded by the project entitled "Experimental Research and Mathematical Modelling of Unsteady Phenomena Induced by Hydrodynamic Cavitation" of the Czech Science Foundation.

Dr. Jiříček and his collaborator have studied the structural effect on organic phase change materials [33].

Dr. Hnědkovský (ICT-IPC) and his collaborators have studied the properties of organic solutes in water [34-42].

Prof. Šťastný (UWB) and his co-workers have tested a numerical model of steam flow in a nozzle and in turbine blade cascades with NaCl binary nucleation and condensation to determine thermodynamic losses [43].

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