8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)
14th World Congress on Computational Mechanics (WCCM XIV)
July, 19 - 24, 2020, Paris/ France

STS 21

Computational Technologies for Environmental Protection and Safety

Chair: **Boris Chetverushkin***

* Keldysh Institute of Applied Mathematics, Miusskaya sq. 4, Moscow, 125047, Russia
chetver@imamod.ru

Session Abstract

Keywords: *Multiphase flow, porous material, thermos-acoustic instability, heat flux, nuclear reactor safety, smart city, space-mission vehicle*

The goal of this STS is to assess the state-of-the-art of computational technologies for different industrial applications aimed at environmental protection and safety.
In the STS, the following topics will be discussed:

1. Analysis of multiphase flows in different natural and artificial porous materials.
It is a relevant and important problem. The approach is based on the quasi-hydrodynamic regularization of Navier-Stokes-Cahn-Hilliard model. A number of simulations demonstrating consistency of the model and algorithms as well as the flow simulations within realistic micro-CT models are presented.

2. Investigation of heat fluxes around aerospace vehicles.
The numerical simulation of this problem is based on the quasi-gas dynamics system of equations. The purpose of this research is to ensure the safety of space-mission and supersonic transport vehicles.

3. Conservative characteristic difference schemes in analysis of thermos-acoustic instability of gas turbine combustion chambers.
The main purpose of this work is to develop mathematical models and codes to determine the area of dependence of the flow parameters in the flame chambers of jet engines, which may cause vibration combustion.

4. CABARET-scheme based parameter-free modelling of hydrogen mitigation experiments for nuclear reactor safety.

5. Effective numerical algorithms and engineering software packages for simulating hydro-dynamic currents, the dissemination of impurities, and the dynamics of bottom sediments in the river channel.

6. Transportation problems and info-communication solutions in smart city concept.
For solving these problems it is necessary to use adequate mathematical models of traffic flows forecasting various control scenarios, machine vision technologies to obtain statistics on flows for model validation and ICT to create new Web services to improve the lives of urban residents.

List of tentative paper titles and speakers of STS 21:

Efficient Numerical Algorithm and Engineering Software for Simulating Shallow Water Flows and Sediment Transport
D. Asfandiyarov, A. Cherepanov and O. Sorokovikova
Nuclear Safety Institute of the Russian Academy of Sciences, 52, Bolshaya Tulskaya Street, Moscow, 115191, Russia, http://en.ibrae.ac.ru/, dasfandiyarov@ibrae.ac.ru ,

Conservative Characteristic Difference Schemes in Analysis of Thermo-acoustic Instability of Gas Turbine Combustion Chambers
Vasiliy Goloviznin, Nikita Afanasiev, Vladimir Semenov, Aleksey Sipatov and Sergey Nesterov
Lomonosov, Moscow State University, Russia, 119991, Moscow, GSP-1, Leninskie Gory, http://lim.cs.msu.ru/, gol@ibrae.ac.ru

Kinetic Consistent Algorithm for Incompressible Conductive Fluids
B. Chetverushkin, A. Saveliev and V. Saveliev,
Immanuel Kant Baltic Federal University, 14 Al. Nevskogo, 236016 Kaliningrad, Russia, http://edu.kantiana.ru, saveliev@mail.desy.de

Numerical Investigation of Heat Fluxes around Aerospace Vehicles
Boris Chetvruskin, Aleksandr Lutskii.
Keldysh Institute of Applied Mathematics - Russian Academy of Sciences, Miusskaya sq. 4, 125047 Moscow, Russia, office@kiam.ru, http://www.keldysh.ru, allutsky@yandex.ru

Direct Numerical Simulation of Multiphase Flows at Pore Scale
Vladislav Balashov, Evgeniy Savenkov, Keldysh Institute of Applied Mathematics - Russian Academy of Sciences, Miusskaya sq. 4, 125047 Moscow, Russia,
vladislav.balashov@gmail.com

Advanced PageRank Algorithms for Boarding Navigation
M.V. Yashina, A.G. Tatashev, M.A. Belova, N.P. Susoev, Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia, yash-marina@yandex.ru

Video Traking of Road Pavement Anomaly Using AR-Technology
M.V. Yashina, A.G. Tatashev, A.I. Mokhov, A.A. Davledyanov, Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia, yash-marina@yandex.ru