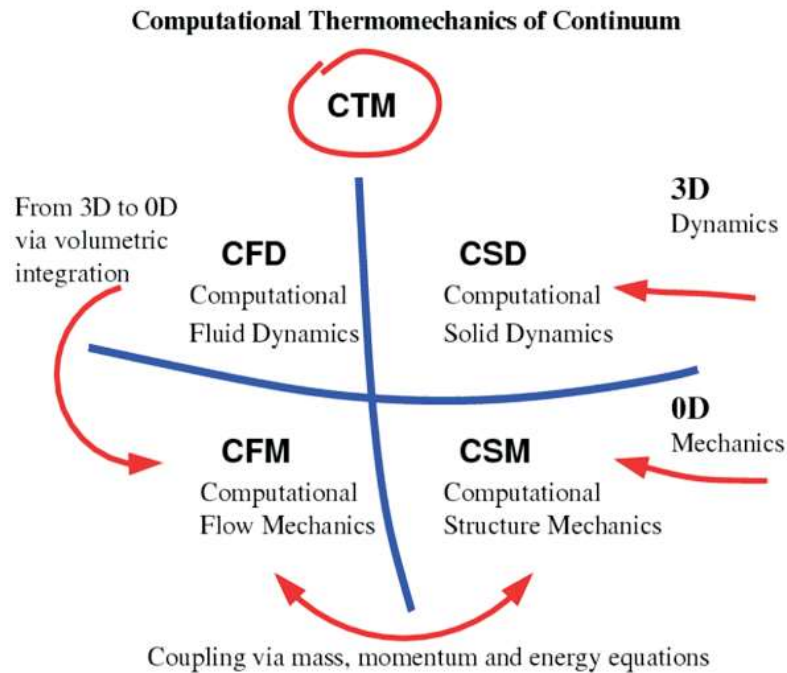


A letter from the guest editor

Energy Conversion in Fluid Flow Machinery – a look on modern computational tools and their industrial applications

This volume of *Transactions of Institute of Fluid-Flow Machinery* is dedicated to twenty anniversary of the Energy Conversion Department which has been erected due to a proposal by professor Jarosław Mikielewicz and strongly supported by late professor Zbigniew Bilicki. The main statute aims of a new department were to develop modern dedicated computational tools as both for scientific researchers and for industrial applications. During that time our Department has been founded and developed four different branches of computational science which we nowadays call: CFD (Computational Fluid Dynamics); CSD (Computational Solid Dynamics); CFM (Computational Flow Mechanics); CSM (Computational Structure Mechanics). The diagram below, composed by Michał Karcz, gives an internal relationship between these four branches.



Among a numerous dedicated mathematical models, that have been worked out and implemented to in-house and commercial codes, it is worth to mention some which have been published or applied for different turbomachinery goals. These are:

- Thermodynamics of weakly non-local fluids undergoing turbulence and phase transition
- Gradiantal microstructure of cavitating water and spontaneously condensing vapor
- Flame-less combustion model
- Model of chemistry-turbulence full-coupling
- Multiscale momentum-heat turbulence model
- High-temperature creep-damage model
- Unified stress-corrosion and damage model
- Common pseudomomentum and pseudoenergy model for fluids
- Innovative gas-steam combined cycle based on coal processing
- Highly effective gas turbine cycle with SOFC
- Three-dimensional model of SOFC
- Exergy destruction model for innovative cycles
- Coke chemical enhancement model
- Thermodynamics of enhancement energy conversion in nano-flows and nano-materials

I would like to cordially thank scientific researchers and coworkers of my Department, especially : Mariusz Banaszkiewicz, Marcin Bielecki, Tomasz Ochrymiuk, Jacek Topolski, Michał Karcz, Adam Wiśniewski, Piotr Kozłów, Sebastian Kowalczyk, Marcin Lemański, Robert Kucharski, Lucjan Nastalek.

Gdańsk 23.10.12

Yours sincerely
Janusz Badur