Topics in fluid dynamics

Lecturer: Jacek Pozorski (IMP PAN); 15 h

The lecture series assumes some previous knowledge on fluid mechanics (at the level of first course). It will be divided into a selection of topics addressing either theoretical aspects or practical features of flow phenomena. Therefore, the material should be of general interest for physicists, chemical and mechanical engineers, and applied mathematicians.

First, important concepts in fluid mechanics will be revisited and presented from a somewhat more general perspective. Then, a selection of useful mathematical tools and techniques will be presented. Next, as a first specific branch of flow phenomena, turbulent flows and their modeling will be presented, including both the origin and formulation of the closure problem, as well as important features of turbulent flows.

This will be followed by the presentation of practical aspects of fluid dynamics for engineering purposes, including widely-used and emerging turbulence models, flow analysis, control, and design problems. Next, flows with chemical reactions will be addressed, emphasizing the system of governing equations, constitutive laws, and closure difficulties for turbulent flows, scalar mixing, the reactive source terms. Specifically, important features of combustion and its modeling will be presented. As a last topic, two-phase flow phenomena will be presented, followed by a selection of computational methods (Eulerian and Lagrangian approaches) for flows with the dispersed phase and for flows with complex interfaces.

TERMINY WYKŁADÓW		
04.05.2011	13.00-15.15	Audytorium IMP PAN
11.05.2011	13.00-15.15	Audytorium IMP PAN
18.05.2011	13.00-15.15	Audytorium IMP PAN
25.05.2011	13.00-15.15	Audytorium IMP PAN
01.06.2011	13.00-15.15	Audytorium IMP PAN
08.06.2011	13.00-15.15	Audytorium IMP PAN

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