Department of Turbomachinery and Fluid Mechanics
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Mech – FLUID MECHANICS – PLAN OF THE LECTURES

Hour No.	Lecture No.	Topic of the lecture
1	1/2	**Introduction**: Problems, methods and areas of application of fluid mechanics. Properties of fluids. Element of fluid. Models of fluids. Categories of flows. Systems of co-ordinates. Basic mathematical relations.
2	3	**Hydrostatics**: Mass and surface forces. Equilibrium of fluids. Euler's equation.
3	4	Hydrostatic forces acting on flat and curved walls. Floating of bodies.
4	6	**Kinematics**: Stream lines. Paths of fluid elements. General motion of a fluid element.
5	8	Principle and equation of mass conservation.
6	9/10/11	**Dynamics**: Principle and equation of momentum conservation. Navier-Stokes equation.
7	15	Bernoulli equation.
8	16	Similarity of flows: Non-dimensional form of the fluid motion equations. Criteria of similarity. Strouhal, Froude, Euler and Reynolds numbers. Scale effect.
9	18	Laminar and turbulent flows. Reynolds experiment. Basics of Kolmogorov theory of turbulence.
10	19/20	Boundary layers and wakes. Prandtl equation. Separation of the boundary layer.
11	22	Cavitation. Physical principles, hydrodynamic consequences.
12	23/24	Potential flows: Laplace equation. Potential and rotational flow around a cylinder. D'Alembert paradox. Joukovsky equation.
13	25/26	Flows in closed channels: One-dimensional flows. Local and linear losses.
14	27/28	Flows in open channels: Unsteady liquid motion. Wave phenomena.
15	29/30	Gas dynamics: Propagation of small and finite disturbances in gas. Speed of sound. Shock waves.

NB! The numbers of lectures refer to the 30-hours lecture plan for the course MiBM (file pw-mbm-10.doc)

Literature

1. Puzyrewski R., Sawicki J.: *Podstawy mechaniki płynów i hydrauliki*, PWN Warszawa 1998
2. Gryboś R.: *Podstawy mechaniki płynów*, tom I, PWN Warszawa 1998
3. Burka E.S., Nałęcz T.J.: *Mechanika płynów w przykładach*, PWN Warszawa 1999
4. Ciałkowski M.: *Mechanika płynów – zbiór zadań z rozwiązaniami*, Wydawnictwo Politechniki Poznańskiej 2008
5. Tesch K.: Mechanika płynów, Wyd. Politechniki Gdańskiej 2008