

Course: Analytical solution of flow
Number: 22846
Course: 3 hours
Credit: 2.5
Prerequisite: Differential Equations

Objectives:

1. Having deeper insight of theories related to flow.
2. Modeling and solving new flow problems
3. Identifying equivalence between flow and Electrodynamics theory
4. Specialization in mathematical methods and applications
5. Use of numeric algorithms for solving

Course's Description

Flow phenomena in a narrow gap between two surfaces fed by injected sources and sinks, usually encountered in heat transfer industries and lubrication devices. Equivalent setups appear in electrodynamic theory, and the solution methods coincide.

Poisson equation and its solution by Green functions

Special subjects: viscous flow on two dimensional manifolds, 2D conformal maps, spheres and stereographic projections, images, holomorphic functions and their uses, stream-line representation, Lagrange v.s. Euler representations of flow.

Website: <http://moodle.braude.ac.il/course>

Grade's determination: 100% work submission (no exam)

Work topics:	
Complex plane	1
Creeping flow	2
Manifolds	3
Conformal maps	4
Apollonius	5
Image approach	6
Computerized Simulations	7
Electric discipline equalization	8
Streamlines	9
Results analyzation	10

Dynamics of vortices	11
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- There may be changes

Course booklet:

Dr. Ayelet Goldstein and Dr. Ofer Eyal (option)

Recommended literature:

Landau Lifshitz: A course in theoretical Physics: "Fluid dynamics"	.1
Saffman: Vortex Dynamics, Cambridge university press 1992	.2
Milne-thomson: Theretical Hydrodynamics 5 th 1968	.3
G.K. Batchelor: An introduction to Fluid Dynamics, Cambridge university press,	.4

Learning outcams:

The student should develop the ability of corresponding objects of the reality (physical or industrial ones) with mathematical objects. He should adjust an appropriate experimental model due to the equivalence between the two diciplines of fluid mechanics and electromagnetizm. Attention will be paid on some programs used for numerical solutions.

Comments

Assignments:

- One hard copy for each group
- Personal upload to the internet site