



[22.5h+15h exercises] 3 credits

This course is taught in the 2nd semester

Teacher(s): André Berger, Eric Deleersnijder
Language: french
Level: 1st cycle course

Aims

The objective of the course is to introduce to the principles of fluid physics and dynamics. Such an introduction leads to the analysis of the physical nature and mathematical expression of the conservation of mass, momentum, kinetic energy, internal energy and enthalpy. The equations of motion, from where the Navier-Stokes equations are derived, are general. Simple examples can be deduced to illustrate the general circulation of the planetary atmospheres.

Main themes

1. Physics of Flow. 1.1. Introduction to the Continuum Concept; 1.2. Fluid Kinematics; 1.3. Steady and unsteady Flows; 1.4. Elementary motions: translation, rotation, divergence and deformation. 2. Conservation of Mass. 2.1. Equation of Continuity; 2.2. Incompressibility and solenoidal flow; 2.3. Mixing of fluids; 2.4. Conservation of a specific field property; 2.5. Potential vector and stream function; 2.6. Irrotational flow and velocity potential; 2.7. Rotational flow; 2.8. Boundary conditions. 3. Momentum. 3.1. Equation of motion; 3.2. Pressure and fluid statics; 3.3. Motion and stress; 3.4. Navier-Stokes equation; 3.5. Atmospheric circulation. 4. Conservation of Kinetic energy. 5. Conservation of Internal energy and Enthalpy.

Content and teaching methods

See Objectives and Table of Content

Other credits in programs

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| PHYS12 | Deuxième candidature en sciences physiques | (3 credits) | Mandatory |
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