

Titolo del corso:

Hydrodynamic and Morphodynamic Stability

Docenti:

Stefano Lanzoni

Programma:

Hydrodynamic Stability

- Transition to turbulence
- Linear Stability Analysis
- Stability of plane-parallel flows
- Plane uniform flows
- Orr-Sommerfeld equation
- Solutions of the Orr-Sommerfeld equation
- Linear stability analysis of ideal plane-parallel flows
- Linear stability of stratified plane-parallel flows
- General criteria for the stability of inviscid stratified flows
- Examples of linear and weakly-nonlinear stability analysis of a model problem
- Example of weakly nonlinear stability analysis
- Stability analysis in morphodynamics

Testi di riferimento:

Lanzoni, S. 2010. Advanced Fluid Mechanics

Titolo del corso:

Mechanics of Turbulence

Docenti:

Stefano Lanzoni

Programma:

Mechanics of Turbulence

- Introduction
- Mathematical description of turbulence
- Mean values
- Turbulent intensity
- Spatio-temporal correlation functions
- Stationarity and homogeneity
- Stationary and homogeneous turbulence
- Relevant turbulence scales

Generalities on the numerical solution of Navier Stokes equations

- Reynolds equations
- Kinetic energy of the mean flow
- Turbulent kinetic energy equation
- Vorticity dynamics
- Vorticity in the Navier Stokes equations
- Vorticity equation
- Kelvin circulation theorem
- Vortex stretching
- Energy spectrum
- Taylor hypothesis
- Energy Cascade

Testi di riferimento:

Lanzoni, S. 2010. Advanced Fluid Mechanics