

Waves and Instabilities in Fluids (Module Number 13440)
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Elements of fluid dynamics

01. Continuum mechanics. Vector analysis. Stress tensor
02. Deformation of a continuous deformable medium. Continuity equation
03. Perfect fluid. Euler equation. Bernoulli equation. Hydrostatics
04. Viscous fluid. Navier-Stokes equation
05. Applications to Euler and Navier-Stokes equations. Bounded systems. Stationary flows

Waves

06. Generalities. Sound waves (linear waves)
07. Surface gravity waves
08. Tsunamis
09. Solitons

Elements of nonlinear dynamics, instabilities and pattern formation

10. Linear stability analysis
11. Bifurcation diagram
12. Kelvin-Helmholtz instability
13. Rayleigh-Bénard instability
14. Multi-component systems. Chemical reactions. Brusselator. Turing instability

Literature

- [1] P. K. Kundu, I. M. Cohen - Fluid mechanics
- [2] Lecture notes: <https://www.b-tu.de/fg-statistische-physik/lehre/skripte>