General theory in fluid mechanics

Laminar flows

- Free shear layers
- Laminar boundary layers
- Laminar flows in cavities, channels, ducts, and conduits
- Laminar jets
- Laminar wakes
- Low-Reynolds-number (creeping) flows
- Potential flows
- Stability of laminar flows
- Thin film flows

Flow instabilities

Turbulent flows

- Boundary layer turbulence
- Boundary-free shear flow turbulence
- Coherent structures
- Direct Numerical Simulations
- Eddy-viscosity closures; Reynolds stress modeling
- Flows in pipes and nozzles
- Fundamentals
- High-Reynolds-number turbulence
- Large Eddy Simulations
- Open channel flow turbulence
- Secondary currents/flows
- Similarity (scaling) theory
- Statistical theories and models
- Transition to turbulence
- Turbulence control
- Turbulence simulation and modeling
- Turbulent convective heat transfer
- Turbulent diffusion
- Turbulent jets
- Turbulent mixing layers
- Turbulent transport processes
- Turbulent wakes
- Wall-bounded shear flow turbulence

Vortex dynamics; rotating fluids

- Rotating and swirling flows
- Separated flows
- Vortex dynamics
- Vortex interactions

Hydrodynamic waves

- Capillary waves
- Gravity waves

- Shear waves
- Solitary waves
- Wave breaking
- Wave-structure interactions

Non-Newtonian fluid flows

Fractals in hydro-environment and hydraulic/fluid mechanics research

Multiphase and stratified flows

- Aerated flows and bubble dynamics
- Buoyancy-driven flows; convection
- Fluidized beds
- Fluid-particle interactions
- Hydraulic jumps
- Interactions with surfaces
- Interfacial flows
- Particle-laden flows
- Rotational flows
- Stratified flows
- Thermal convection

Flows through porous media

Biological fluid dynamics

Biomechanics

Computational methods in hydro-environment research and fluid dynamics

- Direct Numerical Simulation methods
- Large Eddy Simulation methods
- Lattice Boltzmann methods
- One-dimensional models
- RANS models
- Smoothed Particle Hydrodynamics models
- Three- dimensional models
- Two- dimensional models

Instrumentation, measurements and experimental methods

- Experimental facilities
- Field studies
- Flow visualization and imaging
- Hydraulic models
- Laboratory studies
- Particle Image Velocimetry (PIV)
- Particle Tracking Velocimetry (PTV)
- Pressure and temperature measurements
- Velocity measurements

Applied fluid mechanics and hydraulic engineering

- Aerodynamics
- Boundary layer control
- Bridges and culverts

Coastal engineering
Control structures
Drag reduction
Dredging
Flood modeling
Flood risk
Flow control
Flow-structure interactions
Hydraulic and pneumatic machinery
Hydraulic resistance (drag coefficients and friction factors)
Hydraulic structure design & management
Hydraulics of renewable energy systems
Mixing enhancement
Ocean Engineering
River training structures
Sewer hydraulics
Water pipelines

Environmental Fluid Mechanics

Air-water interface interactions
Avalanches
Bed roughness
Benthic boundary layers and near-bed processes
Canals
Coastal hydraulics
Debris flows
Desalination
Dispersion processes and models
Estuaries
Groundwater/surface water interaction
Hydrothermal systems
Ice streams
Lakes and reservoirs
Morphodynamics and channel forms
Oscillatory flows
Overland flows
Shallow flows
Stratified flows and density currents
Streams and rivers
Tidal flows
Turbidity currents
Water quality
Water-sediment interface interactions
Wetlands, ponds

Eco-hydraulics

- Biofilms
- Fish control structures
- Fish passages
- Flow-biota interactions
- Habitat hydraulics
- Hyporheic zone
- Limnology
- Minimum flows in regulated rivers
- Re-naturalisation of aquatic environments
- River restoration
- Vegetated flows

Sediment transport

- Bedforms
- Bedload
- Cohesive sediments
- Erosion control
- Erosion processes
- Flocculation
- Sedimentation
- Suspended sediments
- Turbulence-sediments interactions

Fluvial geomorphology

- Bars
- Bedforms
- Braiding
- Channel classification
- Meandering
- River channels

History of hydraulics

Hydraulic education

Natural hazards