ENVIRONMENTAL FLUID MECHANICS

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Introduction: Continuity and momentum equations in cartesian and cylindrical coordinates, Rotating frame of reference, Coriolis effects, Basics of buoyancy driven flows, Mixing and transport processes in environmental fluid systems.
Vertical flows: MTT model, turbulent plumes, filling box, double-diffusive convection.
Horizontal flows: Shallow water approximation, single-layer hydraulics, gravity currents, particle-laden flows, flows on inclined plane, high viscous flow.
Flow in porous media: Darcy's law, Dispersion, Thermal and Haline convections, Geothermal Plumes, Gravity currents, Capillary effects, Flow through cracks and faults
Waves in fluids: Interfacial waves and internal gravity waves.
Hydrodynamic instability: Kelvin-Helmholtz Instability.
Rayleigh-Taylor instability, Saffman-Taylor instability.
Geophysical flows: Stratification, The Richardson number, Advective and diffusive mixing, Coastal region intrusion, Rotation, Vorticity dynamics.