Lectures

On

Modern Advances in Mathematical Fluid Dynamics

By

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1. Macroscopic/continuum derivation of fluid dynamics
   - Compressible and incompressible viscous and inviscid flow

2. Statistical derivation of fluid dynamics
   - Liouville equation –Boltzmann equation- Navier-Stokes –Burnett equations

3. Hyperbolic system of conservation laws and shock waves
   - Jump conditions, entropy solutions, numerical methods
   - Inviscid compressible flow (Euler equations)

4. Mathematical theory of Compressible Viscous Flow
   - The Lame system and linearized compressible flow
   - Steady linear and nonlinear compressible Navier-Stokes equations
   - Time dependent compressible Navier-Stokes equations

5. Optimal control of compressible fluid dynamics and Quasilinear Hyperbolic Systems
   - Optimal controls, necessary and sufficient conditions
   - Numerical methods

References: