Thermal convection and flow problems in models for micro channels

UNIBO Ph.D. Program – Mechanics and Advanced Engineering Sciences
A.Y. 2023-2024 – 8 hours

Prof. Brian Straughan - Professor Emeritus, Applied Mathematics
Durham University

WHEN	WHERE
17 October 2023 - 11:00-13:00	7.7 via Saragozza 8
18 October 2023 - 10:00-12:00	7.7 via Saragozza 8
23 October 2023 - 10:00-12:00	7.7 via Saragozza 8
24 October 2023 - 11:00-13:00	7.7 via Saragozza 8

Contents

1. Thermal convection - linear instability theory.
2. Thermal convection - nonlinear energy stability theory.
3. Symmetry and equivalence of linear instability and nonlinear stability. (Examples of symmetry and non - symmetry, with oscillatory convection).
4. Microfluidics - Higher gradient Navier-Stokes theory - convection.
5. Higher gradient Navier-Stokes theory with rotation.
6. Numerical eigenvalue problems and the Chebyshev tau - QZ algorithm method. Application to standard convection theory.
7. Numerical solution of higher gradient Navier-Stokes problems.
8. Further effects. Non-Fourier theory, further higher gradients.