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Lothar Collatz Center
for Computing in Science

GRK 2583

SIAM Student Chapter Hamburg

CAM Nachwuchsgruppe Hamburg

Lothar-Collatz-Seminar

Wed, 19. June · **11:00** · Geom 241

Fabian Bleitner (Universität Hamburg)

Buoyancy-Driven Flows With Navier-Slip Boundary Conditions

Abstract:

In this talk two-dimensional buoyancy-driven flows are investigated. While usually the Navier-Stokes equations are equipped with no-slip boundary conditions here we focus on the Navier-slip conditions that, depending on the system at hand, better reflect the physical behavior. In particular, we study two systems, Rayleigh-Bénard convection and a closely related problem without thermal diffusion. In the former, bounds on the vertical heat transfer, given by the Nusselt number, with respect to the strength of the buoyancy force, characterized by the Rayleigh number, are derived. These bounds hold for a broad range of applications, allowing for non-flat boundaries, any sufficiently smooth positive slip coefficient, and are valid over all ranges of the Prandtl number, a system parameter determined by the fluid. For the thermally non-diffusive system, regularity estimates are proven. Up to a certain order, these bounds hold uniformly in time, which, combined with estimates for their growth, provide insight into the long-time behavior. In particular, solutions converge to the hydrostatic equilibrium, where the fluid's velocity vanishes and the buoyancy force is balanced by the pressure gradient.

For further information please contact

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www.c3s.uni-hamburg.de/news-events/seminar-c3s.html