Universität Hamburg
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Fakultät für Mathematik, Informatik
und Naturwissenschaften
Fachbereich Mathematik

Donnerstag, den 19. November 2026, um 16:15 Uhr, MIN-F, Hörsaal 3

Prof. Dr. Nicholas Kevlahan*

(McMaster University, Dept. Of Mathematics and Statistics, Ontario, Canada)

Multiscale methods for modelling a multiscale world

Zusammenfassung/Abstract:

"How long is the coast of Britain?" When Benoit Mandelbrot asked this question in 1967 he highlighted the inadequacy of classical geometry for modelling natural topography. Over forty years earlier, in 1926, Lewis Fry Richardson had raised a similar problem for turbulence models when he asked "Does the wind have a velocity?"

My talk begins by reviewing the challenges faced by mathematical and computational models of multiscale natural phenomena, focusing on geophysical fluid dynamics. I will show how these challenges can be met for multiscale dynamics, using the example of my WAVETRISK dynamically adaptive global ocean and atmosphere model. I will then propose a new method for modelling complex multiscale coastal geometry, based on periodic homogenization of the porous flow equations. Finally, I will touch on the more challenging problem of heterogeneous multiscale modelling: when a single computational model must resolve different physics at different length or time scales.

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