35th Colloquium Lecture, School of Mathematics Faculty of Mathematics and Physics

Patrick E. Farrell

University of Oxford

March 12th, 2025, 16:00 pm, lecture hall K1

Sokolovská 83, Praha 8 – Karlín

Predicting the future by solving equations

Abstract

Humans have sought to predict the future for as long as we have existed. One of the key ideas of the scientific revolution was that we can predict the future of physical systems by writing down the laws of physics as differential equations and solving them. Our capacity to do this has recently increased dramatically due to better computers, and better algorithms. This technology has quietly revolutionised industrial civilisation in countless ways, from predicting the weather a week in advance, to designing space planes without wind tunnels, and to understanding the gravitational waves detected by LIGO. In this lecture I will review this subject, discuss some of my own contributions, and mention some important open problems in the field.

About the speaker

Professor Patrick E. Farrell works in the Numerical Analysis group at the University of Oxford and serves as a Tutorial Fellow at Oriel College. His research focuses on the numerical solution of partial differential equations, with particular emphasis on finite element methods, bifurcation analysis of nonlinear PDEs, adjoint techniques, and the development of preconditioners and fast solvers. In recognition of his significant contributions, Professor Farrell has received several prestigious awards, including the 2015 Wilkinson Prize for Numerical Software, the 2021 Charles Broyden Prize in Optimization, and a 2021 Whitehead Prize from the London Mathematical Society. Notably, for 2025–2026 he holds the Donatio Universitatis Carolinae Chair at the Faculty of Mathematics and Physics at Charles University in Prague.

Further information
http://msekce.karlin.mff.cuni.cz/colloquia