Applied and Computational Mathematics Seminar

Title: Adaptive Simulations of Hurricane Storm Surge

Speaker: Nicole Beisiegel (University College Dublin)

Date: Mon 25th November 2019 at 1:00PM

Location: Seminar Room SCN 1.25

Abstract: Numerical simulations based on solving the 2D shallow water equations using a Discontinuous Galerkin (DG) discretisation have evolved to be a viable tool for many geophysical applications. We study this method in the context of hurricane-induced flood modelling. On geographic scale, hurricane storm surge can be interpreted as a localised phenomenon making it ideally suited for adaptive mesh refinement (AMR). For that reason we have developed a DG storm surge model on a triangular and dynamically adaptive mesh. In order to increase computational efficiency, the refinement is driven by physics-based refinement indicators capturing major model sensitivities. In this talk we show idealised numerical test cases to demonstrate the model's ability to correctly represent source terms and reproduce known variability of coastal flooding with respect to hurricane characteristics. Furthermore, we show that the AMR significantly reduces computing time while maintaining accuracy and discuss a systematic approach at quantifying benefits of AMR.

https://maths.ucd.ie/ACMSeminars/1920/beisiegel.html