

Mathematics of Dispersion in the Environment

Organised by Alexandra Tzella (University of Birmingham) with Jacques Vanneste (University of Edinburgh) and Gavin Esler (UCL)

Workshop summary

The workshop “Mathematics of Dispersion in the Environment” took place in early April 2016 over two days at the School of Mathematics at the University of Birmingham. The workshop brought together established and early career researchers as well as PhD students working on both theory and applications of dispersion in the environment.

The fourteen speakers covered three broad themes. The first theme concentrated on theoretical and numerical aspects of dispersion. Grigorios Pavliotis (Imperial College London) opened the first session by presenting new results in data-driven coarse graining and applications. Grigoris Katsiolidis (University of Bath) then talked about Multilevel Monte Carlo Approaches for Atmospheric Dispersion Modelling. Some problems in the design of applied stochastic Lagrangian dispersion models were discussed by David Thomson (Met Office). Finally, Gavin Esler (UCL) presented new results on adaptive stochastic trajectory modeling of transport in geophysical flows. Peter Haynes (University of Cambridge) opened the second session with focus on the theme of dispersion in atmospheric and ocean flows. He discussed the subtle interplay between large-scale flow and small-scale mixing. Ignacio Pizzo (Norwegian Institute for Air Research) then talked about Lagrangian transport in the atmosphere. Finally, Ben Devenish (Met Office) focused on the non-Gaussianity in turbulent pair dispersion. The final talk for the day was given by Yue-Kin Tsang (University of Exeter) who concentrated on the stochastic modeling and parametrisation of atmospheric moisture transport.

Continuing on the same theme, Colm Caulfield (University of Cambridge) started the second day with a talk about the efficiency of deep and abyssal ocean turbulent mixing. William Durham (University of Oxford) went on to discuss unmixing or patchiness in the distribution of phytoplankton. The session concluded with Erik van Sebille (Imperial College London) who talked about dispersion and accumulation of plastic litter by ocean currents and eddies. The last session was characterised by a series of talks on transport in porous media (Branko Bijeljic, Imperial College London), in rectangular networks (Alexandra Tzella, University of Birmingham) and in urban environments (Ruth Doherty, University of Edinburgh).

The workshop was a unique opportunity to meet a number of mathematicians, environmental scientists and modellers working on the area of dispersion. The talks stimulated lively discussions beyond the lecture room, during the poster session, coffee breaks, lunches and dinner. All participants found the workshop to be very stimulating and inspiring. A number of possible collaborations and projects have been identified. We hope that these will be carried through with great success!