

C. Wormell, "*Spectral Galerkin transfer operator methods in uniformly-expanding dynamics*"

Full-branch uniformly expanding maps and their long-time statistical quantities are commonly used as simple models in the study of chaotic dynamics, as well as being of their own mathematical interest. A wide range of algorithms for computing these quantities exist, but they are typically unspecialised to the high-order differentiability of many maps of interest, and consequently have a weak tradeoff between computational effort and accuracy.

This talk will cover a rigorous method to calculate statistics of these maps by discretising transfer operators in a Chebyshev polynomial basis. This discretisation is highly efficient: I will show that, for analytic maps, numerical estimates obtained using this discretisation converge exponentially quickly in the order of the discretisation, for a polynomially growing computational cost. In particular, it is possible to produce (non-validated) estimates of most statistical properties accurate to 14 decimal places in a fraction of a second on a personal computer. Some applications of the method to exploration of questions in dynamics will be presented.