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Ricardo Grande : Extreme waves and large deviations for 2D pure gravity deep water waves

mardi 16 décembre 2025 14:40 (45 minutes)

We study the formation of extreme waves from a statistical viewpoint in the context of the pure gravity water wave equations in deep water. We quantify their probability under random Gaussian sea initial data up to the optimal timescales allowed by deterministic well-posedness theory. The proof shows that rogue waves most likely arise through "dispersive focusing",
where phase synchronization produces constructive amplification of the water crest.
The main difficulty in justifying this mechanism is propagating statistical information
over such long timescales, which we overcome by combining normal forms and
probabilistic methods. Unlike previous results, this novel approach does not require
approximate solutions to be Gaussian. This is a joint work with M. Berti, A. Maspero and G. Staffilani.