

國立中山大學應用數學系

學術演講

講者：Prof. Peter Miller (University of Michigan, Ann Harbor)

講題：Extreme Superposition: Models for Large-Amplitude Rogue Waves

時間：2023/12/26 (Tuesday) 11:10~12:10

地點：理 SC 4009-0 教室

茶會：10:30

Abstract

Rogue waves or freak waves are spatially-localized disturbances of a background field that are also temporally localized. In the setting of the focusing nonlinear Schrödinger equation, which is a universal model for the complex amplitude of a wave packet in a general one-dimensional weakly nonlinear and strongly dispersive setting that includes water waves and nonlinear optics as special cases, a special exact solution exhibiting rogue-wave character was found by D. H. Peregrine in 1983. Since then, with the help of complete integrability, Peregrine's solution has been generalized to a family of solutions of arbitrary "order" where more parameters appear in the solution as the order increases. These parameters can be adjusted to maximize the amplitude of the rogue wave for a given order. This talk will describe several recent results concerning such maximal-amplitude rogue wave solutions in the limit that the order increases without bound. For instance, it turns out that there is a limiting structure in a suitable near-field scaling of the peak of the rogue wave; this structure is a novel exact solution of the focusing nonlinear Schrödinger equation — the "rogue wave of infinite order" — that is also connected with the hierarchy of the third Painlevé equation. This is joint work with Deniz Bilman and Liming Ling.

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