SPEAKER:

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TITLE:

High-Order Rogue Waves and Solitons, and Solutions Interpolating Between Them

ABSTRACT:

It is known from our recent work that both fundamental rogue wave solutions (with Peter Miller and Liming Ling) and multi-pole soliton solutions (with R. Buckingham) of the nonlinear Schrdinger (NLS) equation exhibit the same asymptotic behavior in the limit of large order in a shrinking region near the peak amplitude point, despite the quite different boundary conditions these solutions satisfy at infinity.

We show how rogue waves and solitons of arbitrary orders can be placed within a common analytical framework in which the "order" becomes a continuous parameter, allowing one to tune continuously between types of solutions satisfying different boundary conditions. In this scheme, solitons and rogue waves of increasing integer orders alternate as the continuous order parameter increases. We show that in a bounded region of the space-time of size proportional to the order, these solutions all appear to be the same when the order is large. However, in the unbounded complementary region one sees qualitatively different asymptotic behavior along different sequences. In this talk we focus on the behavior in this exterior region. The asymptotic behavior is most interesting for solutions that are neither rogue waves nor solitons. This is joint work with Peter Miller.