STATHIS CHARALAMPIDIS, San Diego State University

Computational Analysis of self-similar blow-up in nonlinear dispersive PDEs

The spectral stability analysis of coherent structures to nonlinear dispersive PDEs is important for investigating whether solutions are stable or not, as a parameter varies. More crucially, if a solution is deemed unstable, it is quite often that such instabilities lead to blow-up in finite or infinite time. This talk will focus on the self-similar blow-up of the (1+1)-dimensional NLS equation by treating it as a bifurcation problem over the nonlinear exponent σ. Upon performing a dynamic rescaling on the NLS, we will present a general method that is capable of identifying self-similar waveforms as stationary solutions in the so-called "co-exploding frame". The spectral analysis of NLS' solutions in the co-exploding frame reveals the emergence of real instabilities but those are connected with symmetries of the PDE in the original frame. Time permitting, recent advances in the generalized Korteweg-de Vries and 2D NLS equations will be discussed.