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Applications of Sinc Spectral Methods to Solitary Waves

Described by Sir Edmund Whittaker as "a function of royal blood in the family of entire functions, whose distinguished properties separate it from its bourgeois brethren," the Cardinal Whittaker Sinc function, sinc, can serve as the basis of a spectral method for solving differential equations whose solutions are expected to be smooth, providing near exponential convergence.

In this talk, we briefly review properties of the sinc discretization and then discuss two applications to solitary wave problems. For such problems, sinc has proven very effective for two reasons. First, it naturally incorporates the typical boundary conditions of solitary waves (vanishing at infinity). Second, it naturally captures the algebraic structure of the solitary wave equations, allowing us to compute the generalized kernel of the linearized equations. We also highlight questions at the interface of analysis and numerical analysis that arise in the application of this method.