1035-35-559   **Terence C Tao*** (`tao@math.ucla.edu`), Department of Mathematics, UCLA, 405 Hilgard Ave, Los Angeles, CA 90095. *Why are solitons stable?*

The theory of linear dispersive equations predicts that waves should spread out and disperse over time. However, it is a remarkable phenomenon, observed both in theory and practice, that once nonlinear effects are taken into account, solitary wave or soliton solutions can be created, which can be stable enough to persist indefinitely. The construction of such solutions is relatively straightforward, but the fact that they are stable requires some significant amounts of analysis to establish, in part due to symmetries in the equation (such as translation invariance) which create degeneracy in the stability analysis. The theory is particularly difficult in the critical case in which the nonlinearity is at exactly the right power to potentially allow for a self-similar blowup. In this article we survey some of the highlights of this theory, from the more classical orbital stability analysis of Weinstein and Grillakis-Shatah-Strauss, to the more recent asymptotic stability and blowup analysis of Martel-Merle and Merle-Raphael, as well as current developments in using this theory to rigorously demonstrate controlled blowup for several key equations. (Received September 10, 2007)