

Self-adaptive moving mesh methods for a class of nonlinear wave equations

Bao-Feng Feng

Department of Mathematics, The University of Texas-Pan American, U. S. A.
email: feng@utpa.edu

Abstract:

In the present talk, we will firstly construct integrable discretizations for several nonlinear wave equations with hodograph transformation such as the short pulse (SP) equation and the coupled short pulse equation etc. Then we will show that these integrable discretizations can be successfully used as self-adaptive moving mesh methods for the numerical simulation of these equations. Various numerical experiments including loop, breather and loop-breather interaction reveal very good results when compared with exact solutions. In the last, we generalize the proposed moving mesh method to a class of nonlinear wave equations irrespective of the integrability of the original nonlinear wave equation or its discrete analogue.

This is a joint work with Dr. Ohta at Kobe University and Dr. Maruno at the University of Texas-Pan American.