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Mark S Alber* (malber@nd.edu), Mathematics Department, 370 Computing Center/Mathematics Bldg., University of Notre Dame, Notre Dame, IN 46556. *The Complex Geometry of Weak Piecewise Smooth Solutions of Integrable Nonlinear PDE's.*

An extension of the algebraic-geometric method for nonlinear integrable PDE's is shown to lead to description of new piecewise smooth weak solutions of a class of N -component systems of nonlinear evolution equations. This class has associated with it energy dependent Schrödinger operators having potentials with *poles* in the spectral parameter. It includes, among others, equations from the Dym and shallow water equation hierarchies. The basic idea of the method is to establish a connection between profiles of the weak quasi-periodic solutions of this class of PDE's and integrable billiard dynamical systems with Birkhoff-type reflection conditions. (Received September 18, 2000)