1093-35-306 **Alina Chertock*** (chertock@math.ncsu.edu), Department of Mathematics, NCSU, Campus Box 8205, Raleigh, NC 27695, and **Jian-Guo Liu** and **Terrance Pendleton**. *Convergence of a Particle Method and Global Weak Solutions for a Family of Evolutionary PDEs.*

We provide global existence and uniqueness results for a family of fluid transport equations by establishing convergence results for the particle method applied to these equations. The considered family of PDEs is a collection of strongly nonlinear equations which yield traveling wave solutions and can be used to model a variety of fluid dynamics. The equations are characterized by a bifurcation parameter b, which provides a balance for the nonlinear solution behavior, and a kernel G(x), which determines the shape of the traveling wave and the length scale. For some special cases, the equations are completely integrable and admit solutions that are nonlinear superpositions of traveling waves that have a discontinuity in the first derivative at their peaks and therefore are called peakons.

We apply a particle method to the considered equations and provide a new self-contained method for proving its convergence. The latter is accomplished by using the concept of space-time bounded variation and the associated compactness properties. From this result, we prove the existence of a unique global weak solution to the family of fluid transport equations for b>1 and a particular choice of G(x) and obtain stronger regularity properties of the solution than previously established. (Received August 19, 2013)