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Title: Convergence of a particle method and global weak solutions for a family of evolutionary PDEs

Abstract: In this talk, I will present 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 flows in fluid dynamics. We apply a particle method to the studied evolutionary 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 in some special cases and obtain stronger regularity properties of the solution than previously established.