

Meeting: 1005, Newark, Delaware, SS 10A, Special Session on Symmetry Methods for Partial Differential Equations

1005-35-175 **Stephen C Anco*** (sanco@brocku.ca), Department of Mathematics, Brock University, St Catharines, Ontario L2S 3A1, Canada. *Exact solutions of semilinear wave equations in $n > 1$ dimensions.*

This talk will describe recent work applying a group foliation method to derive new exact solutions for a class of semilinear radial wave equations in $n > 1$ dimensions, $u_{tt} = u_{rr} + (n - 1)u_r/r + ku^q$, where $k, q = \text{const}$. The method, which is applicable more generally to other nonlinear PDEs, converts this wave equation into a first-order PDE system of group-invariant variables, yielding solutions of a more general form than those given by classical symmetry reduction. As main results, solutions with interesting analytical properties are obtained: finite-energy solutions exhibiting blow-up at a finite time, when $q = 1 + 4/(n - 1)$ is the conformal power; finite-energy smooth static "soliton" solutions, when $q = 1 + 4/(n - 2)$ is the critical power; static monopole solutions (singular at $r = 0$) in both the conformal and critical power cases. Applications of the same method to a similar class of nonlinear Schrodinger/heat equations in $n > 1$ dimensions will also be presented. (Received February 08, 2005)