

Integrable systems and extensions of symmetry algebras

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Abstract:

Lax representations, also known as zero-curvature representations, Wahlquist-Estabrook prolongation structures, or differential coverings, are a key feature of integrable partial differential equations. A number of important techniques for studying integrable PDEs such as inverse scattering transformations, Bäcklund transformations, Darboux transformations, recursion operators, and nonlocal symmetries, are based on Lax representations. The challenging unsolved problem in this theory is to find conditions that are formulated in inherent terms of a PDE under study and ensure existence of a Lax representation. The lectures will discuss a recent approach to this problem. We will show that for some PDEs their Lax representations can be inferred from the second twisted cohomology group of the contact symmetry algebras.