

EQUIVALENCE AND INVARIANTS: AN OVERVIEW

Peter Olver

University of Minnesota, USA

olver@umn.edu

Two objects are said to be equivalent under a prescribed transformation group if one can be mapped to the other by a group element. In particular, symmetries of an object are just its self-equivalences. The case of submanifolds under Lie group and Lie pseudo-group actions is of particular importance, and Élie Cartan gave a general solution to the equivalence problem that relies on matching the functional interdependencies, or syzygies, among their differential invariants. Cartan's solution has been recast into the method of differential invariant signatures that has broad applicability, including image processing, differential equations, the calculus of variations, control theory, a broad range of mathematical physics, differential geometry, classical invariant theory, and so on.

The goal of this talk is to compare and contrast competing approaches to the equivalence problem and the computation of invariants, concentrating on those involving exterior differential systems, those relying on moving frames, and infinitesimal methods dating back to Lie. Recent developments, practical algorithms and some applications of interest will be mentioned during the lecture.