

# "Moving Frames in Applications"

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The course will cover the new, equivariant approach to the classical method of moving frames, and its many applications.

## **Topics to be covered: (time permitting)**

1. Quick review of Lie groups, Lie algebras, Maurer--Cartan forms, structure equations.
2. Jet bundles, prolongation, contact forms; the variational bicomplex; symmetries of differential equations; calculus of variations.
3. Moving frames for Lie groups; invariants, including differential invariants, joint invariants, and joint differential invariants; invariantization; recurrence formulae and differential invariant algebras.
4. Equivalence and symmetry properties of functions and submanifolds; signatures; symmetry groupoids.
5. Applications in differential geometry, differential equations, and image processing, including jigsaw puzzles and cancer diagnosis.
6. Invariant numerical methods; multi-space; geometric integration.
7. Invariant variational problems, applications in mechanics, invariant submanifold flows, integrable systems and recursion operators, signature evolution.