

1038-34-16

**Tom Mestdag\*** ([tom.mestdag@ugent.be](mailto:tom.mestdag@ugent.be)), Department of Mathematics, University of Michigan, 530 Church Street, Ann Arbor, MI 48109. *The invariant inverse problem of the calculus of variations.*

The inverse problem of the calculus of variations consists in finding conditions for the existence of a regular Lagrangian for a given set of second-order ordinary differential equations on a manifold, so that the given equations are equivalent to the Euler-Lagrange equations of the Lagrangian. We discuss the problem for the case that the manifold is in fact a Lie group and that the sought-for Lagrangian is invariant. Although we deal with the problem directly on the tangent manifold of the Lie group, our main result relies on a reduction of the system to a system on the Lie algebra of the Lie group. We present some illustrative examples. (Received December 11, 2007)