

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

1005-34-148      **Elizabeth L Mansfield\*** (e.l.mansfield@kent.ac.uk), IMSAS, University of Kent, CT2 7NF  
Canterbury, England. *Moving frames and integrating  $SL(2)$  invariant ordinary differential equations.* Preliminary report.

Moving frames can be used to perform reductions of ordinary differential equations (ODEs) which are invariant under a Lie group action. The classical theorem gives a complete reduction to solution by quadratures for a solvable group, while moving frames give a one-step reduction, reducing the order of the ODE by the dimension of the group, more or less algorithmically.

There are three inequivalent actions of  $SL(2)$  in the plane, and in each case, we can solve for the moving frame exactly. We can then use both the reduction, and an ODE satisfied by the frame itself, to give solutions to interesting  $SL(2)$  invariant ODES such as the Chazy equation using high school calculus (well, almost). The Chazy equation was solved using Lie symmetry by Clarkson and Olver, in a tour-de-force. The moving frame method is more obviously adjustable, not only to other groups, but to group actions in the particular co-ordinates that arise in the ODE at hand. Large parts of the calculation require only the infinitesimal action and the normalisation equations for the frame, so one point of development is to see exactly how far you can go towards finding good information about the solutions of a given invariant ODE with only this information. (Received February 07, 2005)