# Symmetry techniques for Differential Equations

G. Manno[a] and F. Oliveri[b] and G. Saccomandi[c] and R. Vitolo[d]

[a]Dipartimento di Matematica, Università di Padova

[b]Dipartimento di Matematica, Università di Messina

[c]Dipartimento di Ingegneria Meccanica, Università di Perugia

[d]Dipartimento di Matematica e Fisica "E. De Giorgi", Università del Salento

In the context of the geometric theory of symmetries of (systems of) differential equations (DEs) a natural problem is to see when a DE, either partial (PDE) or ordinary (ODE), is uniquely determined by its Lie algebra of point symmetries. We obtained interesting results applying methods developed in [ 1, 2] to the case of ODEs []

We found an application of generalized symmetry techniques to a system of PDEs coming from the theory of elasticity. Namely we have been able to give a solution to a 2-component asymptotic approximation of a 4-component system of PDEs in two independent variables [ 4].

## REFERENCES

1. G. Manno, F. Oliveri and R. Vitolo: *On differential equations characterized by their Lie point symmetries*, J. Math. Anal. Appl. **332** (2007), 767–786.
2. G. Manno, F. Oliveri, R. Vitolo: *On differential equations determined by the group of point symmetries*, Theoret. Math. Phys. **151** n. 3 (2007), 843–850.
3. G. Manno, F. Oliveri, G. Saccomandi, R. Vitolo: *On the characterization of ordinary differential equations by point symmetries*, Jour. Geom. Phys. (2014), 85 (2014), 2–15.
4. G. Saccomandi, R. Vitolo: *On the Mathematical and Geometrical Structure of the Determining Equations for Shear Waves in Nonlinear Isotropic Incompressible Elastodynamics*, J. Math. Phys. 55 (2014), 081502.