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*Approximate symmetry analysis*

There are effective symbolic algorithms for determining the Lie symmetry algebra structure of transformations leaving invariant algebraic systems of partial differential equations. Such algorithms depend on generalization of Grobner basis methods to differential systems. Direct application of such methods to models involving approximate data is unstable and usually yields uninteresting results, since the even the tiniest error, means that such methods can at most detect generic symmetries of nearby models, rather than exceptional symmetry rich models.

In this talk we discuss progress in the numerical detection of symmetry rich models which is stable to small errors in data. This builds on earlier results where we showed that the dimension of symmetry algebras of nearby symmetry rich models could be detected. Our method is to couple the geometrical technique of involutive systems with the singular value decomposition to the defining systems for such approximate symmetries. This is joint work with Tracy Huang and Ian Lisle.