1048-35-235 **Wenyuan Wu*** (wenyuanwu@math.msu.edu), Mathematics Department, Wells Hall, MIchigan State University, East Lansing, MI 48823, and **Greg J Reid** (reid@uwo.ca), Department of Applied Mathematics, Middlesex College, University of Western Ontario, London, Ontario N6A 5B7. *On the algorithmic geometric prolongation of systems of partial differential equations.* Preliminary report.

In the formal geometric theory of PDEs, prolongation-projection (differential-elimination) procedures determine integrability conditions. Fundamental results were initially conjectured by Cartan, proved by Kuranishi under certain generic conditions, and recently refined by Malgrange. However while geometers may implicitly invoke geometric descriptions, it still remains to replace their methods by algorithmic prolongation procedures, which are effective for systems of differential polynomials with multiplicities. The methods of Rosenfeld-Kolchin-Ritt, extended to effective (and implemented) algorithms by Boulier et al, are applicable to exact input over computable fields, and not amenable to approximate computation.

In this talk, an effcient approach is presented to compute the geometric prolongation of PDE at a point. Such a geometric approach can be adapted to numerical computation by using the Singular Value Decomposition (SVD) - a fundamental technique of numerical linear algebra. Both symbolic and numerical examples are given and further applications for partial differential equations will be also discussed in this talk.

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