1023-46-480   **J.F. Colombeau*** (`jf.colombeau@wanadoo.fr`), J.F.Colombeau, 33 rue de la Noyera, pavillon 17, Villefontaine, France, 38090. *Nonlinear Generalized Functions as a tool for Nonsmooth Nonlinear Problems in Mathematics and Physics.*

A differential algebra of nonlinear generalized functions is presented as a tool for a very wide range of nonlinear nonsmooth problems [Colombeau,Bull.AMS,23,2,1990,p251-268;the book:Grosser-Kunzinger-Oberguggenberger-Steinbauer,Geometric theory of generalized functions with applications to general relativity, Kluwer,2001]. The power of the differential algebra is used to do mathematical calculations or proofs; then the final result is often a classical function or distribution which is not solution in the classical or distributional sense. This theory explains results of formal calculations of physics, resolves paradoxes and provides new results [Steinbauer-Vickers,Class.Quantum Grav.23,2006,R91-R114; the book: Colombeau, Multiplication of distributions,Lecture Notes in Math.1532, Springer,1992]. The aim of the talk is to invite the listeners to applying this tool in their own research without significant prerequisites (the simplest formulations use classical calculus in several variables only) by presenting its use on a sample of elementary applications from mathematics and physics (including ill-posed inverse problems). (Received September 17, 2006)