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Web: https://en.wikipedia.org/wiki/Jean-Michel_Coron

Jean-Michel Coron received the engineering degree from École polytechnique, Paris, France, in 1978 and from the Corps des Mines in 1981. He received the Thèse d'État in 1982. He has been a researcher at Mines ParisTech, then an associate professor at École polytechnique, and

a full professor at Université Paris-Sud (Paris 11). He is currently a full professor at Université Pierre et Marie Curie (Paris 6) and a member of the French Academy of sciences.

Until the 90's, Coron worked on partial differential equations arising in differential geometry (Rellich's conjecture, Yamabe-type problems, harmonic maps) and in the physics of liquid crystals. Later, Coron moved to control theory and in particular to the stabilization of nonlinear

control systems and the control of systems modeled by means of partial differential equations (Euler and Navier-Stokes equations of incompressible fluids, shallow water equations, Schrödinger equations, Korteweg-de Vries equations).

Coron was selected to deliver a plenary lecture in control theory at ICIAM congress 2015 and at ICM 2010. He received many prizes, including the W. T. and Idalia Reid Prize (2017), the Maxwell prize (2015) and the Fermat prize (1993). He was the recipient of an ERC advanced grant (2011-2016).

Title: How the nonlinearities can be used to control a system

Abstract: A control system is a dynamical system on which one can act thanks to what is called the control. For example, in a car, one can turn the steering wheel, press the accelerator pedal etc. These are the control(s). One of the main problems in control theory is the controllability problem. It is the following one. One starts from a given situation and there is a given target. The controllability problem is to see if, by using some suitable controls depending on time, the given situation and target, one can move from the given situation to the target. We study this problem with a special emphasis on the case where the nonlinearities play a crucial role. In finite dimension in this case a key tool is the use of iterated Lie brackets as shown in particular by the Chow theorem. This key tool gives also important results for some control systems modeled by means of partial differential equations.

However we do not know how to use it for many other control systems modeled by means partial differential equations. We present methods to avoid the use of iterated Lie brackets. We give applications of these methods to the control of various physical control systems (Euler and Navier-Stokes equations of incompressible fluids, 1-D hyperbolic systems, heat equations, shallow water equations, Korteweg-de Vries equations, Schroedinger equations...) and to the stabilization problem, another of the main problems in control theory.