

Around Helffer-Nourrigat conjecture (history, proof, open questions and applications)

Bernard Helffer
Laboratoire de Mathématiques Jean Leray
Université de Nantes
2 Chemin de la Houssinière, B.P. 92208
F-44322 Nantes Cedex
email :Bernard.Helffer@univ-nantes.fr

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After recalling the main advances about the study of hypoelliptic differential operators in the 1970's, I will present how we came with Jean Nourrigat to the statement of our conjecture about the maximal hypoellipticity of polynomials of vector fields. This was recently proved by Ianiros Androulidakis, Omar Mohsen and Robert Yuncken with new techniques inspired by the Connes-Skandalis C^* -algebraic approach. Then I will present the microlocal version of maximal hypoellipticity and recently studied applications related with PDE or mathematical physics problems.