ERIC SAWYER, McMaster University

Sums of squares of functions and matrices with application to hypoellipticity in the infinitely degenerate regime

This is joint work with Luda Korobenko. We extend the well-known theorem of Fefferman and Phong, that decomposes nonnegative C3,1 functions as finite sums of squares of C1,1 functions, to handle the case of C4,2delta functions. Additional assumptions are needed for this, and we give examples to demonstrate sharpness, in particular answering a question of Bony et al regarding elliptic such functions. These results are then extended to nonnegative matrices where they are applied to obtain new results on hypoellipticity of smooth infinitely degenerate operators. The techniques include extending a theorem of Mike Christ on sufficient conditions for smooth hypoellipticity to rough hypoellipticity, which is then applied back in the smooth case. The reason for the interest in decomposing nonnegative C4,2delta functions lies in the fact that the resulting sum is of squares of C2,delta functions, which have enough regularity to permit two differentiations in the case of second order rough operators.