Laplacians for smooth generalised distributions

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We report on recent work with Yuri Kordyukov, concerning the construction of Laplacians for an arbitrary smooth generalised distribution (of non-constant rank), for instance the distributions appearing in sub-Riemannian geometry. For any distribution as such, we construct Riemannian metrics in a smooth way. This allows us to construct a sum of squares type Laplacian along the distribution, whose symbol is commutative. The Chernoff self-adjointness criterion applies for these operators.

Moreover, viewing such Laplacians in the longitudinal pseudo-differential calculus of the smallest singular foliation containing the distribution, we prove its hypoellipticity.

Finally, we generalise the Rothschild-Stein parametrix construction for these operators.

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