Obstructions to factorization of differential operators on the algebra of densities on the line

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Algebra of densities was introduced in 2004 by H. Khudaverdian and Th. Voronov in connection with Batalin-Vilkovisky geometry. It is a commutative algebra with unit and an invariant scalar product naturally associated with every manifold (and containing the algebra of functions). It gives a convenient framework to consider differential operators acting on densities of different weights simultaneously. We shall show that factorization of differential operators acting on densities on the line is different from what we know for the classical case, where factorizations always exist and their structure is known due to Frobenius's theorem. We explicitly describe the obstruction to factorization of the generalized Sturm-Liouville operator in terms of a solution of the corresponding classical Sturm-Liouville equation. See [1].

References

[1] E. Shemyakova, Th. Voronov, Differential operators on the algebra of densities and factorization of the generalized Sturm-Liouville operator, arXiv:1710.09542 [math-ph].