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Mathematical Physics

Self-adjoint commuting differential operators and commutative subalgebras of the Weyl algebra

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In this paper we study self-adjoint commuting ordinary differential operators. We find sufficient conditions when an operator of fourth order commuting with an operator of order $4g+2$ is self-adjoint. We introduce an equation on coefficients of the self-adjoint operator of order four and some additional data. With the help of this equation we find the first example of commuting differential operators of rank two corresponding to a spectral curve of arbitrary genus. These operators have polynomial coefficients and define commutative subalgebras of the first Weyl algebra.

Subjects: **Mathematical Physics (math-ph)**; Exactly Solvable and Integrable Systems (nlin.SI)

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