Mathematics > Classical Analysis and ODEs

# Krall-Laguerre commutative algebras of ordinary differential operators

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*(Submitted on 19 Jul 2011)*

In 1999, Grunbaum, Haine and Horozov defined a large family of commutative algebras of ordinary differential operators which have orthogonal polynomials as eigenfunctions. These polynomials are mutually orthogonal with respect to a Laguerre-type weight distribution, thus providing solutions to Krall's problem. In the present paper we give a new proof of their result which establishes a conjecture, concerning the explicit characterization of the dual commutative algebra of eigenvalues. In particular, for the Koornwinder's generalization of Laguerre polynomials, our approach yields an explicit set of generators for the whole algebra of differential operators. We also illustrate how more general Sobolev-type orthogonal polynomials fit within this theory.

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| Subjects: | **Classical Analysis and ODEs (math.CA)**; Quantum Algebra (math.QA) |
| DOI: | 10.1007/s10231-011-0219-9 |
| Cite as: | **arXiv:1107.3773 [math.CA]** |
| | (or **arXiv:1107.3773v1 [math.CA]** for this version) |

## Submission history

From: Plamen Iliev [view email]
**[v1]** Tue, 19 Jul 2011 16:49:46 GMT (18kb)

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