

Special Issue
of
Journal of Symbolic Computation
on

Effective Methods in Rings of Differential Operators

Guest Editors: Francisco J. Castro-Jiménez & J. Rafael Sendra

Aim

The theory of D-modules (or the algebraic-geometric study of systems of linear partial differential equations) has witnessed an impressive development in the last 30 years, mainly due to the work of the Japanese and the French schools. These achievements have been based on the inner relationship among geometry, algebra, analysis and topology.

Ideals in rings of differential operators are one of the most relevant sets of mathematical objects in this theory, since they play an analogous role to that of polynomial ideals in algebraic geometry. During the last years, many algorithms for manipulating differential operator ideals (and their induced D-modules) have been built up. These algorithms rely heavily on Gröbner bases theory for differential operator rings and allow to associate to each D-module some invariants of either geometric or combinatorial type. The computational methods in differential operator rings have endowed us with algorithms to determine such invariants. The purpose of this Special Issue is to give an overview of the state-of-the-art of current research in these topics.

Scope

Papers discussing the construction and application of algebraic-geometric methods to rings of differential operators and their modules are solicited. Possible topics, within this scope, include but are not limited to:

- Effective computation of a finite presentation of a finitely generated module over rings of linear differential operators.
- Syzygies and free resolutions of finitely generated modules over rings of linear differential operators.
- Effective computation of Bernstein polynomials and Bernstein ideals.
- Slopes and Gröbner Fan. Applications to the irregularity of systems of partial differential equations.
- Non-commutative homogeneization. Computation of standard bases.
- Cohomology groups of solutions of systems of partial differential equations.
- Structure of the solution space of a system of partial differential equations.
- Explicit logarithmic cohomology and logarithmic D-modules.

Submission

Papers must be submitted to one of the editors (see addresses below). Submission must be in English and written using the JSC L^AT_EXstyle file, which can be obtained from

<http://www4.ncsu.edu:8030/~hong/jsc.htm>

Although there is no restriction on length, we would prefer shorter papers (15 pages or less) to longer ones, for the sake of greater diversity and more thorough reviewing.

Electronic submissions are encouraged as Postscript files. The Postscript form must be interpretable by Ghostview, and must use standard fonts, or include the necessary fonts. Authors who cannot meet these requirements should submit 5 hard copies by post instead.

All submitted papers will be refereed according to the usual JSC refereeing process.

To aid planning and organization, we would appreciate an email or a letter of intent to submit a paper (including author information and a tentative title and abstract) as early as possible.

Deadline

Papers must be sent, following the submission instructions, before **August 31, 2000**. Late submissions will risk rejection without consideration.

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