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Edited by E. Tournier

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We would also like to thank Claire Di Crescenzo for her very useful help in the preparation of this book with Latex.

Evelyne Tournier

Preface

When the Organizing Committee of CADE began to choose the program of CADE-92, it was decided that \mathcal{D} -modules would be a central topic at this conference.

The theory of \mathcal{D} -modules is quite recent. It began in the late sixties and at first was considered to be quite abstract and difficult. Over the years the situation improved with the development of the theory and its applications. The organizers felt that it was time to try to introduce it to a larger audience interested in differential equations and computer algebra, since the theory of \mathcal{D} -modules offers an excellent way to effectively handle linear systems of analytic PDEs.

Once this decision was made it was natural to ask Bernard MALGRANGE to be the *“invité d’honneur”* at CADE-92, with the task of lecturing about \mathcal{D} -modules in a way adapted to an audience interested in effectivity. This was natural because Bernard MALGRANGE is not only one of the most famous mathematicians in this field, but also because he is perhaps the true originator of this direction. It is generally admitted that \mathcal{D} -module theory began in the early seventies with the fundamental work of I. N. BERSTEIN and of the Japanese school around M. SATO, but in fact Bernard MALGRANGE introduced the basic concepts ten years ago for the constant coefficients case (see his 1962 Bourbaki report *“systèmes différentiels à coefficients constants”*), and later for the general case (see his lectures at Orsay *Cohomologie de Spencer (d’après Quillen)*).

I think it was quite a challenge to explain the basic ideas of \mathcal{D} -module theory to an audience of non-specialists with such a variety of interests, but Bernard MALGRANGE helped by A. GALLIGO and Ph. MAISONOBE took up this challenge.

I hope that the readers of the book will enjoy this introduction as much as the participants of CADE-92 did. Moreover this volume also contains many other interesting approaches to computer algebra and differential equations, such as theoretical aspects in dynamical systems and normal forms.

Jean-Pierre RAMIS