

Preface

The finite volume method consists in a space discretization technique for partial differential equations. It is based on the fundamental principle of local conservation (or more generally local balance), making it very natural and successful in many applications, including fluid dynamics, magnetohydrodynamics, structural analysis, nuclear physics, and semiconductor theory. Motivated by their large applicability for real-world problems, finite volumes have been the purpose of an intensive research effort in the last decades, yielding significant progresses in the design, the numerical analysis, and the practical implementation of the methods.

Research on finite volumes remains very active since the problems to solve are everyday more complex and demanding. Among the current challenges addressed by the scientific community, let us mention for instance the design of robust (with respect to the mesh and/or physical parameters) numerical methods, of high-order methods, and of methods preserving structural properties (positivity and dissipation of a prescribed quantity). The implementation of such methods on new architectures is also a crucial issue.

Previous conferences on this series have been held in Rouen (1996), Duisburg (1999), Porquerolles (2002), Marrakech (2005), Aussois (2008), Prague (2011), and Berlin (2014).

The present volumes contain the invited and contributed papers presented as posters or talks at the Eighth International Symposium on Finite Volumes for Complex Applications held in Lille, June 12–16, 2017. It also contains a benchmark on discretizations for incompressible viscous flows governed by Stokes and Navier–Stokes equations.

The first volume contains the invited contributions, the benchmark on discretizations for incompressible viscous flows, and some contributed papers focusing on theoretical aspects of finite volumes, including discrete functional analysis tools, convergence proof, and error estimates for problems governed by partial differential equations.

The second volume is focused on the simulation of problems arising in real-world applications, such as complex fluid mechanics, elasticity problems, and complex porous media flows.

The volume editors thank the authors for their high-quality contributions, the member of the program committee for supporting the organization of the review process, and all reviewers for their thorough work on the evaluation of each of the contributions.

The organization of the conference was made possible thanks to the financial support of Lille 1 University, the Centre National pour la Recherche Scientifique (CNRS), Inria, Total, IFP Energies nouvelles, the CEA, the Labex CEMPI and AMIES, the Weierstrass Institute for Applied Analysis and Stochastics (WIAS), the Universities of Nice, Paris 13, and Paris-Est Marne-la-Vallée.

Finally, we warmly thank the local organization committee and staff for their precious help to make this conference a friendly moment.

Villeneuve-d'Ascq, France
Gif-sur-Yvette, France
March 2017

Clément Cancès
Pascal Omnes

Finite Volumes for Complex Applications VIII - Methods
and Theoretical Aspects

FVCA 8, Lille, France, June 2017

Cancès, C.; Omnes, P. (Eds.)

2017, XII, 476 p. 74 illus., 52 illus. in color., Hardcover

ISBN: 978-3-319-57396-0