Parallel Scientific Computing by Guillaume Houzeaux, now available in English
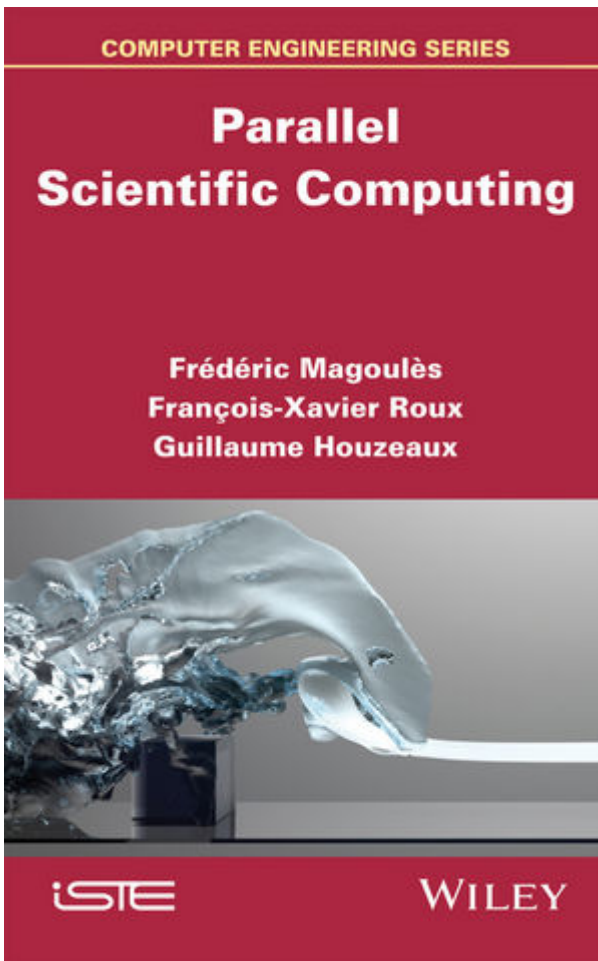

Co-authored by BSC researcher Guillaume Houzeaux, *Parallel Scientific Computing*, the English version of *Cálculo científico Paralelo*, published two years ago in Spanish, has now been released. The other two authors are Frédéric Magoulès and François-Xavier Roux, French researchers with whom Houzeaux's team collaborates on issues of linear algebra for HPC, mainly in asynchronous iterative solvers.

The book describes state-of-the-art parallelisation techniques for solving partial differential equations on shared and distributed memory supercomputers. According to Houzeaux "Parallelisation is now essential for numericists. It requires new ways of programming and additional skills to write efficient parallel simulation codes."

Description

Scientific computing has become an indispensable tool in numerous fields, such as physics, mechanics, biology, finance and industry. For example, thanks to efficient algorithms adapted to current computers, it enables us to simulate the deformation of a complete aircraft structure, the sound level in a theatre

auditorium or fluid flowing around the wing of an aircraft, without the help of models or experiments.

This book presents scientific computing techniques applied to parallel computing for the numerical simulation of large-scale problems; these problems result from systems modelled by partial differential equations. Computing concepts are demonstrated via examples. Implementation and programming techniques resulting from the finite element method are presented for direct solvers, iterative solvers and domain decomposition methods, along with an introduction to MPI and OpenMP.

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