Dedicated to Professor Roland Glowinski on the occasion of his 70th birthday

FOREWORD

The special issue of the International Journal of Numerical Analysis and Modeling is dedicated to Professor Roland Glowinski on the occasion of his 70th anniversary.

Dr. Glowinski has made important contributions in many areas of Computational and Applied Mathematics, his main interest being the numerical solution of the problems involving partial differential equations and inequalities. In fact, in order to appreciate his many contributions we decided that the simplest way is to reproduce, after translation from French to English, the description of his contributions available on the Website of the French National Academy of Sciences:

"The scientific activity of Roland Glowinski has been mostly dedicated to the solution of problems modeled by partial differential equations or inequalities, most of these problems being related to applications from mechanics, physics and the engineering sciences."

A doctoral student of Jacques-Louis Lions, Roland Glowinski has privileged the variational approach for the solution of many problems modeled by partial differential equations and inequalities, including situations where the problem under consideration is not, strictly speaking, an Euler-Lagrange equation from the Calculus of Variations. On the basis of this approach, the methods developed by Roland Glowinski have been used by himself and other scientists in order to solve problems

from mechanics, physics, engineering sciences, life sciences and, more recently, finance.

Through the systematic use and possible combinations of least-squares methods, conjugate gradient and augmented Lagrangian algorithms operating in Hilbert spaces, domain decomposition and fictitious domain methods, finite element space approximations and operator-splitting time discretizations, Roland Glowinski has been able to solve a large variety of problems related to important applications. Let us mention, for example, the first simulation worldwide of the transonic flow of a compressible inviscid fluid around a full aircraft, the direct numerical simulation of particulate flow when the number of particles is of the order of 10,000 (resp., 1,000) in two dimensions (resp., three dimensions), the popularity in the rheologist community of his augmented Lagrangian methods for the simulation of the flow of non-Newtonian fluids with yield stress. Thanks to the first numerical implementation of the Hilbert Uniqueness Method (HUM) of J.L. Lions, Roland Glowinski methods have found applications in the optimal control of systems described by linear and nonlinear partial differential equations. More recently, these methods have been applied to the numerical solution of fully nonlinear elliptic equations of the Monge-Ampre type."

Dr. Roland Glowinski has been honored with several awards, which include:

- In 1988, the (French) Seymour Cray Prize for his computer implementation of the Hilbert Uniqueness Method for the exact boundary controllability of the wave equation.
- In 1996, the Grand Prix Marcel Dassault of the French National Academy of Sciences for his contributions to Computational Fluid Dynamics.
- In 2004, the SIAM Theodore Von Kàrmàn Prize for his contributions to Computational Fluid Dynamics.

Other honors include:

- An invited lecture at the International Congress of Mathematicians in 1983, in Warsaw.
- Fairchild Distinguished Visiting Scientist at the California Institute of Technology, 1st semester of the academic year 1988-1989.
- 1999 IMA Distinguished Lecturer with lectures at Brunel University, Oxford University and Imperial College of Science, Technology and Medicine.
- The Von Kàrmàn Lecture at the 2004 SIAM National Conference in Portland, Oregon.
- An invited lecture at the International Conference on Industrial and Applied Mathematics in 2007, in Zurich.
- Being a member of the editorial board of more than twenty scientific journals and series.

Dr. Roland Glowinski is the author and co-author of many publications, which include the following widely used books:

- R. GLOWINSKI, J. L. LIONS and R. TRÈMOLIÈRES, *Numerical Analysis of Variational Inequalities*, North-Holland, Amsterdam, 1981.
- M. FORTIN and R. GLOWINSKI, *Augmented Lagrangians: Application to the Numerical Solution of Boundary Value Problems*, North-Holland, Amsterdam, 1983.

- R. GLOWINSKI, *Numerical Methods for Nonlinear Variational Problems*, Springer, New York, NY, 1984 (2nd edition in 2008).
- M. BLANC, D. FONTAINE, R. GLOWINSKI and L. REINHART, *Simulation of Electron Transport in the Earth Magneto-Sphere*, Gordon Breach, New York, NY, 1987.
- R. GLOWINSKI and P. LE TALLEC, *Augmented Lagrangians and Operator-Splitting Methods in Nonlinear Mechanics*, SIAM, Philadelphia, PA, 1989.
- R. GLOWINSKI, *Finite element methods for incompressible viscous flow. In Handbook of Numerical Analysis*, Vol. IX, P.G. Ciarlet and J.L. Lions, eds., North- Holland, Amsterdam, 2003, pp. 3-1176.
- R. GLOWINSKI, J. L. LIONS and J. W. HE, *Exact and Approximate Controllability for Distributed Parameter Systems: A Numerical Approach*, Cambridge University Press, Cambridge, U.K., 2008.

We have been told that Dr. Roland Glowinski has three books in preparation; if this is indeed the case, the least we can do is to wish him the best with these projects and hope to see these books available soon to the Computational and Applied Mathematics community. We have no doubt that they will be useful to many of us.

Zhangxin Chen, University of Calgary
Kaitai Li, Xi'an Jiaotong University
Tsorng-Whay Pan, University of Houston