Preface

Sergio R. Idelsohn Barg^{1,3} · Eugenio Oñate^{1,2}

Published online: 8 October 2019
© OWZ 2019

The particle finite element method (PFEM) has become widespread in sciences, engineering applications, biomedical sciences, applied mathematics and many other areas.

The application areas of PFEM are quite wide like: granular flows, soil excavations, sediment transport, particle-laden flows, ship hydrodynamics, material design, biomedical engineering, turbulent flows and many others.

Furthermore, in the last 20 years, PFEM in its two versions: PFEM with moving mesh and PFEM with fixed mesh, has evolved both in its mathematical justification and in its feasibility to be used in multiple applications, showing its accuracy as well as its potentiality for applications not yet explored by other numerical methods.

In this Special Issue, 10 recently completed works are presented, five of which summarize the evolution of PFEM from the point of view of the numerical methodology and the five remaining works show different applications, in particular to biomedical problems, shockwaves in spillways, particle laden flows, sediment transport problems and soft soil excavation.

In the first part dedicated to the method itself, it is interesting to see the application to the solution of unstable (turbulent) fluids, where the use of particles facilitates the convective transport of the smaller eddies, thus allowing the use of relatively coarse meshes.

As Editor of this Special Issue, we want to thank all the authors for their invaluable contribution, each with an interesting subject. We also want to thank the multiple reviewers who did the job of correcting, criticizing and improving the manuscripts. Lastly, we would also like to thank the Editors of this Journal, Tarek Zohdi, Eugenio Oñate and Peter Wriggers, for inviting us to edit this Special Issue and to be able to promote the advances made in PFEM in recent years.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

✉ Sergio R. Idelsohn Barg
sergio@cimne.upc.edu

¹ International Center for Numerical Methods in Engineering (CIMNE), Barcelona, Spain

² Universitat Politècnica de Catalunya (UPC), Barcelona, Spain

³ Catalan Institution for Research and Advanced Studies (ICREA), Barcelona, Spain