RECENT ADVANCES AND APPLICATIONS OF THE PARTICLE FINITE ELEMENT METHOD (PFEM)

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ABSTRACT

The objective of this invited session is to present and discuss the last advances in the Particle Finite Element Method (PFEM) [1,2] and its derived methodologies, such as the PFEM of second generation (PFEM-2), and the Smoothed PFEM (SPFEM).

This session covers not only the last theoretical developments of the methods but also their recent applications to challenging industrial and engineering case studies. We encourage the submission of works applied to coupled problems involving fluid-structure interaction (FSI), multi-phase flows, thermal-coupled analysis, or phase-change phenomena, among others.

Works showing co-simulation of the PFEM, or its derived approaches, and other numerical methods are also welcome. Some examples of these coupled strategies are the use of the PFEM in the context of multi-scale simulations and the combination of the PFEM and the Discrete Element Method (DEM) for the solution of particle-laden flows.

REFERENCES

[1] Idelsohn, S. R., Oñate, E., & Pin, F. D. (2004). The particle finite element method: a powerful tool to solve incompressible flows with free-surfaces and breaking waves. *International journal for numerical methods in engineering*, 61(7), 964-989.

[2] Cremonesi, M., Franci, A., Idelsohn, S., & Oñate, E. (2020). A state of the art review of the particle finite element method (PFEM). *Archives of Computational Methods in Engineering*, 27(5), 1709-1735.