EngOpt2018 - 6th International Conference on Engineering Optimization
Instituto Superior Técnico, Lisbon Portugal • 17-19 September, 2018
Editors: H.C. Rodrigues, J. Herskovits, C.M. Mota Soares, et al.

Abstract ID 1126

INDUSTRIAL CHALLENGES FOR LEVEL-SET-DRIVEN MESH-EVOLUTION-BASED TOPOLOGY OPTIMIZATION

Felipe Bordeu[(1)], Julien Cortial[(1)], Florian Feppon[(2)]

[(1)]SAFRAN TECH, France
felipe.bordeu@safrangroup.com, julien.cortial@safrangroup.com

[(2)]Ecole polytechnique, France
florian.feppon@polytechnique.edu

Keywords: topology optimization,level set,industrial application,body-fitted mesh

Abstract: Many variants of level-set topology optimization have been proposed in the scientific literature. One key differentiating aspect is the physical interpretation of the implicitly defined solid-void interface. One possibility among others is to rely on body-fitted spatial discretization of the computational domain. This approach possesses many attractive features, in particular providing at all time an unambiguously-defined solid-void interface, not requiring level-set-aware mechanical solver and offering a seamless transition to fine-tuning, mesh-deformation-based shape optimization. However, the relevance of this ambitious technology in an industrial context remains unproven. Indeed, it has essentially been applied on academic problems characterized by a limited set of well-behaved optimization criteria, elementary geometries, and coincident computational and design domains. On the other hand, industrial problems typically feature a rich set of optimization criteria including manufacturing constraints, involved design domain geometries due to integration constraints arising from the part environment, and the presence of functional interfaces that must be preserved to connect adjacent parts. This contribution aims at illustrating the associated challenges as well as recent progress towards the treatment of industrial-grade test cases.