



ESAFORM Webinar Series 2025

Digital Twins empowering engineering design and operation

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Registration link, in advance for this meeting:

<https://videoconf-colibri.zoom.us/meeting/register/M7NIBAOLTiaTaXy5aa3-Cw>

Abstract

This presentation revisits the two main levels of digitalization in engineering: (i) CAD and simulation, empowering assets design; and (ii) digital twins to operate optimally the manufactured assets. Digital Twins composed of the asset itself, its virtual counterpart (fully physics-based, fully data-driven or hybrid models) and the data transiting between both to ensure monitoring and control, are becoming the best allies of engineers. Hybrid DT, combining physics-based and data-driven models, enables making faster (real-time) and better (by modelling the prediction to measurement bias). It can be applied in the domain of materials, processes, structures and systems, for diagnosis, prognosis and decision-making. Thus, evaluation (what if), optimization, inverse analysis, uncertainty propagation and control perform in real-time. Moreover, recently, artificial intelligence made impressive progresses with its generative capabilities, that in the domain of engineering leads to the very promising generative design, where DT enables making faster, better, larger, cheaper, safer and finally, different!

Biography

Francisco Chinesta is currently full Professor of computational physics at Arts et Metiers Institute of Technology (Paris, France), Honorary Fellow of the “Institut Universitaire de France” – IUF- and Fellow of the Spanish Royal Academy of Engineering. He was (2008-2012) AIRBUS Group chair professor and since 2013 he is ESI Group chair professor on advanced modeling and simulation of materials, processes, structures and systems. He received many scientific awards, among them the IACM Fellow award, the IACM Zienkiewicz award (New York, 2018), the ESAFORM award, He is author of about 450 papers in peer-reviewed international journals and more than 1200 contributions in conferences. He was president of the French association of computational mechanics (CSMA) for 8 years, and he is at present president of the French Association of Mechanics. He was director of the CNRS research group (GdR) on model order reduction techniques in engineering sciences for 10 years and he is at present the director of the recently created GdR I-GAIA on data and artificial intelligence based augmented engineering. He is editor and associate editor of about ten international journals, and received many distinctions, among them, the Academic Palms, the French Order of Merit, ... in 2018 the Doctorate Honoris Causa at the University of Zaragoza (Spain) and in 2019 the Silver Medal from the French CNRS. He is the director of the DESCARTES project on Hybrid Artificial Intelligence that the CNRS develops in its hub at Singapore (35 M€, 5 years and more than 350 years of accumulated research).

