ICEM2022 VALENCIA
XXV International Conference on Electrical Machines
Valencia Conference Centre
Valencia - SPAIN
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# ICEM'2022 TUTORIAL

**TUTORIAL NAME:** Fitting Multiphysics Simulation of PMSM with Practical Measurements

**TUTORIAL PRESENTERS (Full Names, affiliations and e-mails)** ***(Max 2)*****:**

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**BIOS OF THE PRESENTERS (max 150 words each):**

Alejandro L. Rodríguez was born in Oviedo (Spain). He received the B.Sc. degree in Telecommunication Engineering from the University of Oviedo (Spain) in 2010 and the M.Sc. degree in Process Control, Industrial Electronics and Electrical Engineering from the same University in 2011. He has also received the Ph.D. degree from the University of Santiago de Compostela (Spain) in 2016 for a thesis entitled Development of a Multidisciplinary and Optimized Design Methodology for Surface Permanent Magnet Synchronous Machines.

Since 2017 he has been working as an Electromagnetic (EM) Application Engineer in Altair where his main field of study is the modeling and simulation for EM practical applications including electric machines, electromagnetic energy transfer, induction heating, power electronics and magnetic material properties.

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**ABSTRACT (max 200 words):**

Permanent Magnet Synchronous Machines (PMSM) are widely used in a huge variety of applications such as electric vehicles (EV), elevation, industry, or electric appliances.

A countless number of models of PMSM have been developed for decades to evaluate their performances. The more advanced of them deal with several physical domains to fulfil an increasingly demanding and complex set of specifications.

However, to take fully advantage of these models, they need to be fitted with real practical measurements. Fitting with measurements a complex model which includes several physical domains is not an easy task; not only it is necessary to identify the most meaningful variables to be adjusted but specific expertise is needed to carry out practical experiences and correlate the obtained data.

This tutorial proposes a complete multiphysics model which includes electromagnetics, thermal and vibratory domains, fitting all of them with practical measurements. Moreover, for each domain, variables having a major role in the fitting process will be identified and adjusted. This will enhance model robustness, making of it the ideal candidate for designing processes.

A practical example using a PMSM machine called IkerMaq will be proposed as example case.