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Université de Technologie de Compiègne  
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### **Model order reduction techniques for Computational surgery**

#### **Abstract:**

Numerical simulation for surgery training or planning is a formidable task that, despite the current computational capabilities, has had a limited success in real surgery practice. This is so due to the obvious complexity of human anatomy and the different phenomena taking place at different time and length scales during surgery.

Research in my group has been based on the need for some model order reduction of this formidable task. This seminar will overview recent results in the field towards the construction of our own surgical simulator. It will also include some very recent results on the development of patient-specific models (the so-called patient “avatars”). These include the use and the development of state-of-the-art, linear and non-linear, model order reduction techniques.

#### **Bio:**

Elías Cueto obtained his bachelor degree at the university of Oviedo, and his doctoral degree at the university of Zaragoza in 2001, with a thesis about the Natural Element Method. He has been assistant professor at the university of Oviedo, and, since then, has taught at the university of Zaragoza, where he is currently full professor. He has been invited professor at the Ecole Centrale de Nantes, France, and the University of Seville, Spain.

Prof. Cueto has served as elected member of the executive council of the Spanish Society of Numerical Methods in Engineering (SEMNI), and the board of directors of the European Scientific Association of Material Forming (ESAFORM). He is or has been member of the editorial board of several journals like the International Journal of Material Forming, where he serves as associate editor, the European Journal of Computational Mechanics, or the Revista Internacional de Métodos Numéricos para Cálculo y Diseño en Ingeniería.

Prof. Cueto has published three books and more than 80 papers in different international journals, along with more than 100 contributions to international conferences. This work has been awarded with the Juan C. Simo prize of the Spanish Society of Numerical Methods in Engineering, the Scientific Prize of the ESAFORM, the prize of the CETIM foundation (France) and the O. C. Zienkiewicz prize of ECCOMAS.