Combining traditional modelling, model order reduction and big data

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Abstract
Traditional modelling often results in systems of partial differential equations to describe physical phenomena. Subsequently, numerical methods are developed to enable simulations. This has led to many different simulation tools for a large variety of aspects: thermal, electromagnetic, flow.
Due to the need for more accurate simulations, there is a need to perform coupled simulations that take into account various aspects. An example is the coupled electro-thermal simulation of electronic circuits or LED components. Clearly, such coupled multi-physics simulations easily lead to extremely large systems of discrete equations. Model order reduction should then be applied in order to retain only dominant coupling mechanisms, and discard less important features. This is especially important in the context of so-called digital twins.
Another important aspect in this enterprise is the use of simulation software in data rich environments. Data obtained via sensors can be used to update the models, and use them to obtain more accurate and more realistic simulations.
In this talk, we will discuss these developments, and give some examples. For additional information of this new initiative, see also http://www.eu-maths-in.eu/EUMATHSIN/2018-new-modeling-simulation-and-optimization-in-a-data-rich-environment/.

Short biography of speaker
Wil Schilders studied Mathematics, with Physics and Astronomy, at the Radboud University in Nijmegen, The Netherlands, from 1974-1978, and obtained his PhD from Trinity College Dublin in 1980. From 1980-2006 he worked at Philips Research, mainly on mathematical software, and from 2006-2010 at NXP Semiconductors. Since 1999, he was also a part-time professor at TU Eindhoven on scientific computing for industry. In 2010, he moved to TU Eindhoven, and also became the director of the Platform Wiskunde Nederland. He has been active within the European Consortium for Mathematics in Industry (ECMI), chairing the Research and Innovation Committee. Since 2015, he is also president of EU-MATHS-IN, the European Service Network of Mathematics for Industry and Innovation (www.eu-maths-in.eu). More information: http://www.win.tue.nl/~wschilde/.