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Modeling the heart function

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In this presentation I will highlight the interplay between data science and computational science to efficiently solve real life large scale problems . The leading application that I will address is the numerical simulation of the heart function.
Mathematical models based on first principles allow the description of the blood motion in the human circulatory system, as well as the interaction between electrical, mechanical and fluid-dynamical processes occurring in the heart. This is a classical environment where multi-physics processes have to be addressed.
Appropriate numerical strategies can be devised to allow an effective description of the fluid in large and medium size arteries, the analysis of physiological and pathological conditions, and the simulation, control and shape optimization of assisted devices or surgical prostheses.
This presentation will address some of these issues and a few representative applications of clinical interest.

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