ABSTRACT
Physically-based computer animation methods are capable of simulating complex real-world phenomena with enough accuracy to make them useful in a variety of applications, such as fashion design, marketing, industrial prototyping, industrial and medical training simulators, virtual human modelling, and visual effects. Many of these applications need a good balance between simulation accuracy and computational demands, often requiring real-time feedback on single workstations. From a computational perspective, simulating the dynamics of real-world elastic materials requires the solution of highly nonlinear, anisotropic and heterogeneous optimization problems, for which established numerical methods perform poorly. To reach interactivity, gross approximations are often done on the dynamic equations, leading to either significant mispredictions of physical behavior or numerically unstable simulations that are outright unusable. In this seminar, some challenges to speeding up the numerical optimization of complex non-linear physical phenomena will be discussed. The focus will be on real-time solvers with fixed and small hard time budgets available.

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