OPTIMAL CONTROL AND APPLICATIONS IN BIOMATH

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ABSTRACT

Mathematical models and simulations are of increasing relevance for applications in engineering and the life sciences. With modern numerical methods and the ever increasing computing power not just simulations of biological systems are within reach, but also questions of optimizing the systems to aim at a certain goal can be addressed.

In this talk we will present concepts and tools from constrained optimization, that can be applied to biomathematical models, e.g. in disease dynamics or biomechanics. Besides the set of differential equations describing the systems behavior, we introduce suitable cost functions to model to goal of the optimization task. With the help of adjoint variables, the first order optimality conditions will result in a set of coupled differential equations allowing the computation of minimizers for the cost functional. Examples from epidemiology and biomechanics will illustrate this method.