Vortrag von Markus Kantner im Mathematischen Kolloquium am 27.04.2021:

Mathematical Modeling and Optimal Control of the COVID-19 pandemic

Abstract:

The public debate on the management of the COVID-19 pandemic is dominated by a contentious discussion on the socio-economic costs of non-pharmaceutical interventions (NPIs) and their deployment to control the disease. Mathematical models are indispensable for predicting the further course of the spread of infection and allow to estimate the impact of different NPIs. In this talk, we give an overview on mathematical modeling of epidemics and present a survey on several approaches to COVID-19 modeling. Based on an extended SEIR model (susceptible-exposed-infectious-removed), that is tailored to certain COVID-19 specific aspects, we compute an optimal control strategy (i.e., the temporal course of the mean contact reduction rate) according to Pontryagin's maximum principle. The obtained control policy minimizes the number of disease-related deaths at minimal socio-economic costs, while avoiding an overflow of the available intensive care units at any time.