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COVID-19 Using Inverse Problem for Coefficient Identification in SIR Epidemic Models

The COVID-19 coronavirus appeared in late 2019 and quickly spread across many countries. By the end of April 2020, there were more than 3 million confirmed cases of infected people, with more than 200,000 reported deaths globally. Governments closed the so-called non-essential businesses and services for weeks in order to slow down the growth of infections – especially among vulnerable populations – and thus, save lives.

This work deals with the inverse problem in epidemiology based on a SIR model with time-dependent infectivity and recovery rates, allowing for a better prediction of the long term evolution of a pandemic. The method is used for investigating the COVID-19 spread by first solving an inverse problem for estimating the infectivity and recovery rates from real data. Then, the estimated rates are used to compute the evolution of the disease. The time-depended parameters are estimated for the World and several countries.