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# Inverse problem resolution of COVID-19 SIR-model Clayton A Dehn

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In this work, an inverse problem of early-age COVID-19 pandemic trend is exhibited in order to compute reliable SIR model parameters. The novelty of the present analysis compared to the COVID-19 modeling literature is that the proposed inverse problem also considered unknown initial conditions and variable definition interval of the problem. Hence, four different algorithms were built to resolve the designed optimization problem (OP) for this study. The OP considers a series of least square errors minimization in terms of both principal differential error and classical estimation error. Thus, SIR model parameters were computed by means of Principal Differential Analysis formulation, the initial conditions were computed by means of a randomized differential free minimization algorithm, and the OP's validity interval of time was estimated using a pointwise algorithm inspired by Statistical Process Control (SPC) procedures. The approach was applied for nearly 60 countries and showed interesting results in term of algorithm's accuracy and errors of estimation. .

## Biography

Mostapha El Jai is currently an Assistant Professor of Mechanical and Industrial Engineering at the Euromed University of Fes, Morocco. He received his Ph.D. in Industrial Engineering at Sidi Mohamed Ben Abdellah University. He an engineering degree (Master's equivalent) from Ecole Nationale Superieure d'Arts & Metiers, Moulay Ismail University of Meknes, Morocco. His research interest includes parametric identification problems, optimization in Additive Manufacturing and other real-life engineering problems. Dr. El Jai is the author or coauthor of more than 15 papers in international refereed journals and more than 5 conference contributions. He has given several talks at national and international conferences..

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