Perspectives of modeling COVID-19 transmission via integral equations

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The ongoing COVID-19 pandemic has become a major threat to the entire globe. In order to support better understanding and controlling strategies, different modeling approaches can be utilized. Compartment models such as SIR and SEIR are the center of attention in many models. General concern on integral equation models in disease transmission is considerably low due to the intuitive temptation of modeling in terms of rate of change of response variables. This study expresses possibilities of modeling COVID-19 transmission in terms of integral equations catering accumulation effect that can be observed in several influencing factors. Both Volterra and Fredholm integral equations can be used to model this, since these influences can accumulate within constant, variable or fixed intervals. Several advantages of integral form over differential form arise via different types of kernels accommodating variety of behaviors. The accumulation of factors with time deferment effect can be modeled by difference kernel while causative factors which consist of cross-references in different platforms can be formulated by degenerated kernels. This study motivates to oversee integral equations as a modeling tool in the broader area of mathematical epidemiology.

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