A SIMPLE MATHEMATICAL MODEL ON SPREAD OF COVID-19 AND ITS APPLICATION TO JAPAN

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ABSTRACT
The spread of Covid-19 causes serious damages to Japanese society since 2020. In this talk, a simple mathematical model is presented to describe spread of Covid-19 used to predict the number of day-by-day new cases in Tokyo and Osaka. The prediction has been posted on a homepage of the speaker, updated once in a week or two weeks, and has been picked up for broadcast on nationwide TV networks several times when the situation got serious. The used data for prediction is simple, day-by-day number of new cases in Tokyo and Osaka, and day-by-day number of cases based on the date of onset in Tokyo. The dynamics of infection is described with a simplified version of SIR model, where the period of infection of a patient is assumed to be a constant instead of obeying to an exponential distribution. The model also takes into account of the delay from exposure to development and then to announcement to public. It is shown that the model works reasonably well in spite of its simplicity. We consider that this simplicity is important, since it enables more people to understand the nature of the dynamics and hence may help critical decision makers of the country to take effective countermeasures at the right timing.