Chapter 7
Effective Lockdown and Plasma Therapy for COVID-19

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Abstract COVID-19 is a major pandemic threat of 2019–2020 which originated in Wuhan. As of now, no specific anti-viral medication is available. Therefore, many countries in the world are fighting to control the spread by various means. In this chapter, we model COVID-19 scenario by considering compartmental model. The set of dynamical system of nonlinear differential equation is formulated. Basic reproduction number R_0 is computed for this dynamical system. Endemic equilibrium point is calculated and local stability for this point is established using Routh-Hurwitz criterion. As COVID-19 has affected more than 180 countries in several ways like medically, economy, etc. It necessitates the effect of control strategies applied by various government worldwide to be analysed. For this, we introduce different types of time dependent controls (which are government rules or social, medical interventions) in-order to control the exposure of COVID-19 and to increase recovery rate of the disease. By using Pontryagins maximum principle, we derive necessary optimal conditions which depicts the importance of these controls applied by the government during this epidemic.

Keywords COVID-19 · Basic reproduction number · Local stability · Optimal control

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