Mathematical Models of Infectious Diseases and Social Issues

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Chapter 1
Controlling Asthma Due to Air Pollution

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ABSTRACT

The health of our respiratory systems is directly affected by the atmosphere. Nowadays, eruption of respiratory disease and malfunctioning of lung due to the presence of harmful particles in the air is one of the most sever challenge. In this chapter, association between air pollution-related respiratory diseases, namely dyspnea, cough, and asthma, is analysed by constructing a mathematical model. Local and global stability of the equilibrium points is proved. Optimal control theory is applied in the model to optimize stability of the model. Applied optimal control theory contains four control variables, among which first control helps to reduce number of individuals who are exposed to air pollutants and the remaining three controls help to reduce the spread and exacerbation of asthma. The positive impact of controls on the model and intensity of asthma under the influence of dyspnea and cough is observed graphically by simulating the model.

INTRODUCTION

Rapid growth in population and industrialization have resulted in increasing demand for energy which effects the levels of atmospheric particulate matter. Epidemiological studies have proved that exposure to air pollutants lead to respiratory symptoms

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