

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

ANALYSIS OF SIR MEASLES MODEL USING
EULER'S METHOD

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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ABSTRACT

SIR model which is in the form of system of ordinary differential equations (ODE) is the best mathematical model in representing the epidemic measles outbreak in a population. The trends of measles spread differs as surrounding differs that will lead to variation of parameters used in the equations hence affect the accuracy of solutions of the SIR differential equations. It is identified that the parameters involved in the SIR model are rate of measles transmission and rate of measles recovery. The main objective of this project is to identify the most accurate SIR model based on various sets of parameters proposed by previous researchers. Euler's numerical method is applied in solving the system of differential equations SIR model and from the calculated solutions, identification of the best parameter of rate of transmission, a and rate of recovery, b that are used in simulating the measles outbreak is made.

1 INTRODUCTION

1.1 Introduction

In the 10th century A.D, Muhammmad ibn Zakariya ar-Razzi(860-932) who is a Persian philosopher and physician has written a book titled “ The Book of Smallpox and Measles “ or in Arabic it called Kitab fi al-jadari wa-al-hasbah. The book serves as an early references to measles. The cause of measles is the present of infectious agent in the blood and it has been demonstrated by Francis Home, a Scottish physician in 1757 (Mandal, 2013). In 1592 at the island of Cuba, a measles outbreak have killed roughly two-thirds of the native population (Nordqvist, 2015). Looking at the high mortality rate due to measles throughout many countries, it has become an encouragement for us to measure the number of people infected over a period of time by this particular disease. *Symptom of Measles* (2015) stated that the symptom of measles can be detected through the rash on the body skin.

Figure 1.1: Measles Rash



The measles rash appears around two to four days after the initial symptoms and normally fades after about a week.

- It is made up of small red-brown, flat or slightly raised spots that may join together into larger blotchy patches.
- Usually it first appears on the head or neck, before spreading outwards to the rest of the body and might be slightly itchy for some people.