

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The research of the project is to study the characteristic and behaviour of airflow pattern inside lung bifurcation for diseased human airways in the second and third generations. The area of study concerns the Chronic Obstructive Pulmonary Disease (COPD) which can narrow and obstruct the airways of respiratory flow. COPD is defined as a disease state characterized by the presence of airflow obstruction due to chronic bronchitis or emphysema.

Computational fluid dynamics (CFD) used to examine the effect of COPD towards velocity, pressure drop and flow pattern. SolidWork used as a 3D design for the lung model while CosmosFloWork as the CFD approach. The study also wants to investigate the relation between Reynolds number and the flow characteristics.

1.2 PROBLEM STATEMENT

Chronic Obstructive Pulmonary Disease (COPD) is human trachea disease cause by reduction in diameter of structure, obstruction with inflammation and etc. The studies required to analyze and understand flow characteristics and its effect to the structure for human airways system.

The research used computational fluid dynamics (CFD) software to investigate effect of respiratory flow to daughter branches. Parameter involves Reynolds number and lung diameter. The outcome shown from velocity, pressure changes and flow pattern inside the bifurcation.

1.3 OBJECTIVES

The objectives are to design human airways structure at second and third generation in normal and diseased condition as well as to analyze flow behaviour in asymmetrical human airways due changes of structure.

1.4 SCOPES

The scopes are to design and analyze lung model using CFD software, identify flow behaviour at second and third generation of human airways as well as flow behaviour in normal and tumour condition.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is one of the respiratory diseases nowadays. This illness can come from unhealthy food, air pollution and etc. Lung tumors, emphysema and bronchitis are an example of the COPD. This research concerns the efficiency of diseased human airways to carry air particles toward lung.

This chapter would explain various aspects of the past and present studies consist of related lung design, navier-stokes equation, properties of air, boundary condition, software and clinical term that applied for airflow analysis.