



Research Article

# THE ANALYSIS OF BLOOD FLOW PAST CAROTID BIFURCATION BY USING THE ONE-WAY FLUID SOLID INTERACTION TECHNIQUE (FSI)<sup>†</sup>

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## ABSTRACT:

*This research presents the analysis of blood flow passed carotid bifurcation that are clogged with fat. Blood flow unsteadiness is due to the heart-imposed temporal variations which occur during cardiac cycle. The effects of the Newtonian and Non-Newtonian blood's flow behavior are computed. In this study, the one way fluid–solid interaction (FSI) technique is used to calculate the flow behavior and stress distribution on blood vessel. The results can show the effects from various blood's flow analyses that provide the different wall shear stresses from computation technique. Consequentially, the tendency of potential risks that caused by the plaque rupture can be predicted more accurately and used as a supportive tool for the artery stenosis diagnosis as well.*

**Keywords:** Blood flow; Carotid bifurcation; one-way FSI; two-way FSI

Manuscript Received April 21, 2015; Revised June 16, 2015; Accepted June 20, 2015

## 1. INTRODUCTION

For many years, a stroke is the third leading cause of Thais' death. A plenty of patients must be suffered from a disability due to paralysis. Generally, the patients with cerebral thrombosis, particularly the lack of blood, should be sent to a hospital within 3 hours from the onset of symptom to recover the blood circulation to the brain as soon as possible. To diagnose a stroke, physicians use a medical examination, such as image and Echo-Ultrasound of the carotid bifurcation that allows physicians to examine the abnormal blood vessels of the neck due to the fat-clogged.

When physicians remark the abnormality of stenotic carotid artery, they can treat the patient appropriately in a mean time. If the cause is the narrowing of the inner walls of blood vessels, the physicians can use a balloon or wire mesh (Stent) to stretch the inner wall of the constricted blood vessels. The efficiency of the acute stroke patients treating more relies on the availability of treatment technologies, whether equipment, techniques, medicine or the physician.

However, the use of imaging process and blood flow checking could not provide the sufficient information for physician's diagnosis. Sometimes, the treatment with a balloon or wire mesh will be used, when the symptoms of complete blockage in a blood vessel was detected. One of the major causes of patient death is plaque rupture which the fracture of fat flows passes the blood vessel and clots within the brain. This plaque rupture caused from the high wall shear stress of the artery wall was torn [1] where the wall shear stress value will be proportional to the flow characteristics of blood [2].

<sup>†</sup> Recommended by Associate Editor C. Kanchanomai

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