

Effect of Arterial Stenosis Eccentricity on Blood Flow using Fluid-Structure Interaction Method

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Abstract

Arterial stenosis and the consequent cardiovascular diseases such as atherosclerosis remain the major cause of mortality in the world. In this study, blood flow was analyzed in a three-dimensional model of stenosed carotid artery with asymmetric stenosis utilizing fluid-structure interaction method. The modeling was performed by ANSYS finite element software. To overcome the software inconsistency in FSI mode, a new code was designed in ANSYS multi-physics environment for coupling of solid and fluid domains via incremental boundary iteration method. The results indicated a considerable variation of local blood pressure, velocity and shear stress in stenosed artery, high pressure drop along stenosis, compressive stress and larger flow separation zone in the post-stenotic region as the result of increased eccentricity of stenosis. The results might be applied in evaluation of plaque severity, progression of disease, plaque growth and vulnerable regions of plaque to fracture.

Keywords: Arterial stenosis; Blood flow; Fluid-structure interaction; Plaque rupture; Finite element method

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¹³ Magnetic Resonance Imaging

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¹¹ Homogen

⁴ Reynolds number

⁸ Yamaguchi

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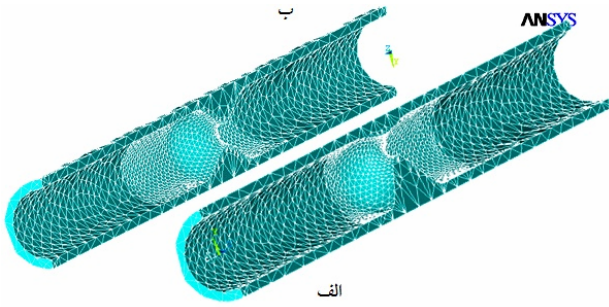
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²¹ Turbulent
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²² ANSIS
²⁶ Fluid Solid Interface

²³ Navier Stokes
²⁷ Search Substructure



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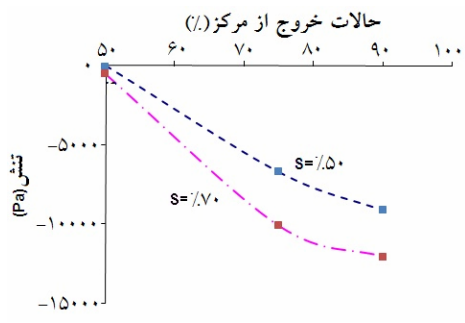
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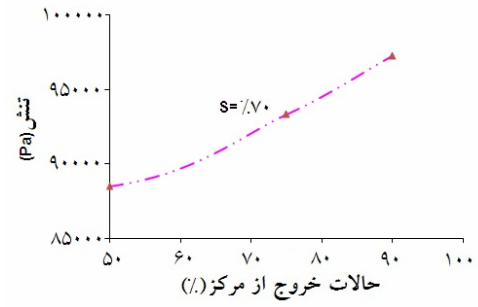
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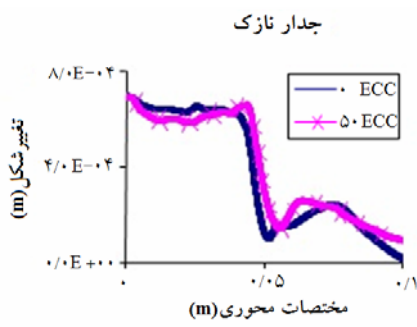
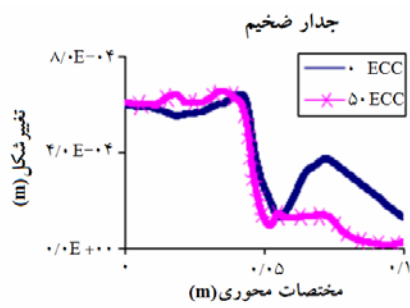
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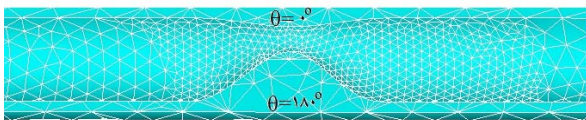


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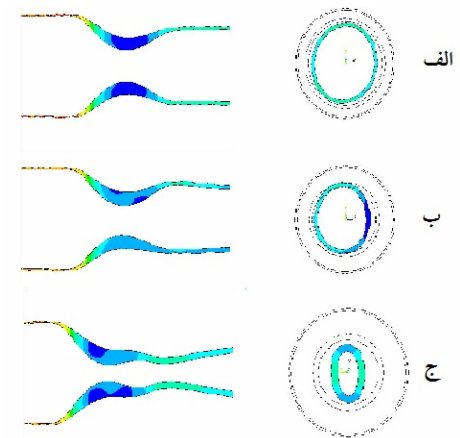


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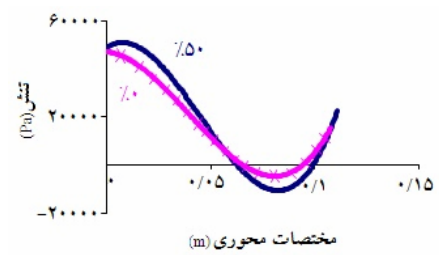
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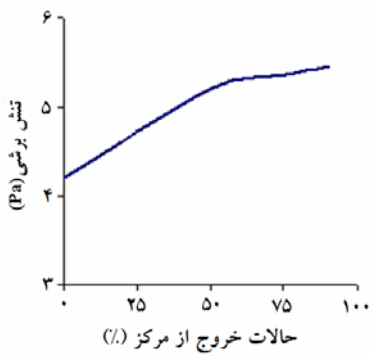
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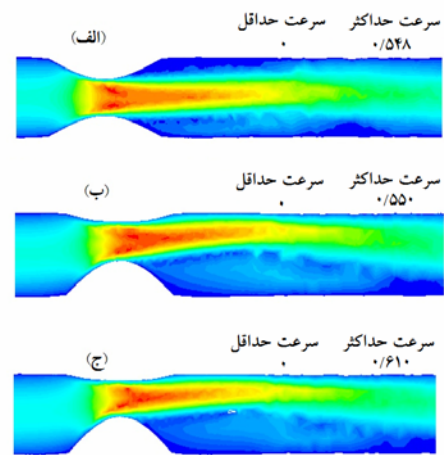
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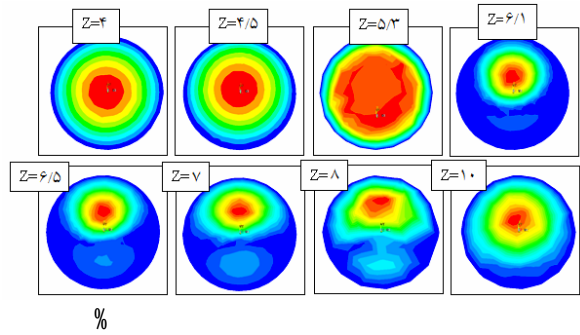


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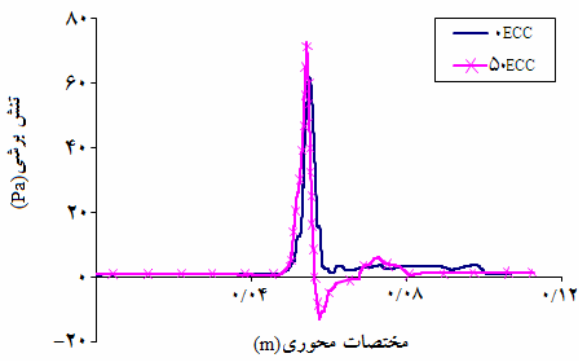
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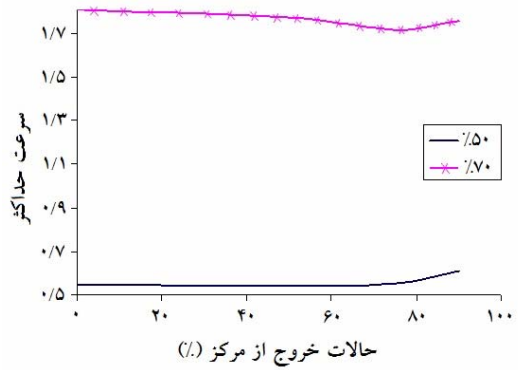
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