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Flow inside an eye under vitreous surgery[1] DAIKI KONO, SHUN SAKAMOTO, JUN SAKAKIBARA, Department of Mechanical Engineering, Meiji University — Vitreous is a clear gel filling the space between crystalline lens and retina in human eye. Under circumstances where the vitreous becomes opaque due to bleeding or other disease, ophthalmologist removes the vitreous from eye by cutting and sucking through a pipe named vitreous cutter, and meanwhile replaces fluid in the eye with a balanced salt solution by injecting it through the infusion port. Jet flow from the infusion port may cause intense flow. Consequently, this may generate a pressure and a shear stress on the retinal wall and possibly lead to the damage of retinal cell. In this study, we visualized the flow inside eye and estimated the shear stress on the retinal wall under the vitreous surgery. Instead of using human eye, we used a spherical shell model simulating human eyeball, and measured the two dimensional distribution of two-component velocity by PIV. Under the condition of Re=66 to 99, which meet in the actual operation, the maximum shear stress reaches 0.4 Pa. This value is insufficient to cause retinal detachment, while any physiological effect on the retinal endothelial cells is still unclear. Flow field under higher Re will be presented in the talk.

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