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Flow investigation in sidewall aneurysm model using a novel PIV multi-time-lag method PIERRE BOUILLOT, OLIVIER BRINA, RAFIK OUARED, KARL-OLOF LOVBLAD, VITOR MENDES PEREIRA, Interventional Neuroradiology Unit, Service of Neuroradiology, University Hospitals of Geneva, MOHAMED FARHAT, Laboratory for Hydrolic Machines (LMH-IMHEF), Ecole Polytechnique Federale de Lausanne (EPFL), Avenue de Cour 33bis, CH-1007 Lausanne, Switzerland — The intracranial aneurysm (IA) lesion is one of the main causes of intracranial hemorrhage in productive population. It is well known that the hemodynamic factors have large impact on both the IAs rupture and treatment efficacy based on flow diverter stents. Precise experimental investigations of blood flow in IAs using particle imaging velocimetry (PIV) are therefore strongly required in order to validate clinical treatments based on computational and clinical flow assessment tools. Due to the large variations of flow velocities in IAs, a single PIV measurement with a unique time lag between two consecutive images cannot provide a good level of precision in all the measured volume. In this work, we implement an error analysis based on several PIV measurements with different time lags to ensure an optimal precision in the entire measurement volume. This PIV multi-time-lag method is applied on a sidewall IA model to investigate the effect of the inflow pulsatility. By comparing the flow patterns resulting from steady and unsteady inflows we point out important differences which could be involved in the IAs evolution. In particular, the blood transfer in the IA and the vortical structure are significantly modified when increasing the pulsatility compared to quasi-steady conditions.

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