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Identification of *critical* zones in the flow through prosthetic heart valves A. LOPEZ, R. LEDESMA, R. ZENIT, G. PULOS, Universidad Nacional Autonoma de Mexico — The hemodynamic properties of prosthetic heart valves can cause blood damage and platelet activation due to the non- physiological flow patterns. Blood recirculation and elevated shear stresses are believed to be responsible for these complications. The objective of this study is to identify and quantify the conditions for which recirculation and high stress zones appear. We have performed a comparative study between a mechanical monoleaflet and biological valve. In order to generate the flow conditions to test the prosthesis, we have built a hydraulic circuit which reproduces the human systemic circulation, on the basis of the Windkessel model. This model is based on an electrical analogy which consists of an arterial resistance and compliance. Using PIV 3D- Stereo measurements, taken downstream from the prosthetic heart valves, we have reconstructed the full phase-averaged tridimensional velocity field. Preliminary results show that critical zones are more prominent in mechanical prosthesis, indicating that valves made with biomaterials are less likely to produce blood trauma. This is in accordance with what is generally found in the literature.

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