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Uncertainty Quantification applied to flow simulations in thoracic aortic aneurysms ALESSANDRO BOCCADIFUOCO, Scuola Superiore Sant'Anna - Pisa, ALESSANDRO MARIOTTI, DICI - University of Pisa, SIMONA CELI, NICOLA MARTINI, Ospedale del Cuore, Fondazione Toscana G. Monasterio, Massa, MARIA VITTORIA SALVETTI, DICI - University of Pisa — The thoracic aortic aneurysm is a progressive dilatation of the thoracic aorta causing a weakness in the aortic wall, which may eventually cause life-threatening events. Clinical decisions on treatment strategies are currently based on empiric criteria, like the aortic diameter value or its growth rate. Numerical simulations can give the quantification of important indexes which are impossible to be obtained through in-vivo measurements and can provide supplementary information. Hemodynamic simulations are carried out by using the open-source tool SimVascular and considering patient-specific geometries. One of the main issues in these simulations is the choice of suitable boundary conditions, modeling the organs and vessels not included in the computational domain. The current practice is to use outflow conditions based on resistance and capacitance, whose values are tuned to obtain a physiological behavior of the patient pressure. However it is not known a priori how this choice affects the results of the simulation. The impact of the uncertainties in these outflow parameters is investigated here by using the generalized Polynomial Chaos approach. This analysis also permits to calibrate the outflow-boundary parameters when patient-specific in-vivo data are available.

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