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Flow recirculation in cartilaginous ring cavities of a human trachea model JOSE MONTOYA SEGNINI, HUMBERTO BOCANEGRA EVANS, Texas Tech University, LUCIANO CASTILLO, Purdue University — Most flow studies of the human respiratory tract assume that the trachea and bronchi have smooth walls despite the fact that the walls in both of these airway generations are lined with cartilaginous rings. Recent studies demonstrate that the rings do have an impact in the flow behavior and particle deposition, but there is still a lack of detailed knowledge of the effect the rings have on the flow evolution. To uncover the flow dynamics near the rings, we employed particle image velocimetry (PIV) and particle tracking velocimetry (PTV) measurements in a Refractive Index-matched facility at a flow rate comparable to a resting state; with a trachea-based Reynolds number Re = 2800. We have carried out high-resolution experiments to capture the velocity field inside the cavity created by the rings in the trachea model. Our data indicate that a small recirculation is created inside the cavities. The recirculation is found in the upstream side of the cavities throughout the trachea. This recirculation will affect the dispersion and collision of particles with the wall. This observation is consistent with previous studies, which have shown an increase in the collision of particles within the ring cavity.

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