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On the Evolution of Pulsatile Flow Subject to a Transverse Impulse Body Force GIUSEPPE DI LABBIO, Concordia University, ZAHRA KESHAVARZ-MOTAMED, MIT, LYES KADEM, Concordia University — In the event of an unexpected abrupt traffic stop or car accident, automotive passengers will experience an abrupt body deceleration. This may lead to tearing or dissection of the aortic wall known as Blunt Traumatic Aortic Rupture (BTAR). BTAR is the second leading cause of death in automotive accidents and, although quite frequent, the mechanisms leading to BTAR are still not clearly identified, particularly the contribution of the flow field. As such, this work is intended to provide a fundamental framework for the investigation of the flow contribution to BTAR. In this fundamental study, pulsatile flow in a three-dimensional, straight pipe of circular cross-section is subjected to a unidirectional, transverse, impulse body force applied on a strictly bounded volume of fluid. These models were simulated using the Computational Fluid Dynamics (CFD) software FLUENT. The evolution of fluid field characteristics was investigated during and after the application of the force. The application of the force significantly modified the flow field. The force induces a transverse pressure gradient causing the development of secondary flow structures that dissipate the energy added by the acceleration. Once the force ceases to act, these structures are carried downstream and gradually dissipate their excess energy.

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