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Numerical study of blood flow and bruits from a realistic arterial stenosis JAEYONG JEONG, DONGHYUN YOU, POSTECH — The arterial stenosis is a major cause of fatal cardiovascular diseases in developed countries. It is well known that a stenosed artery generates distinct sounds called bruits. Many researchers have been trying to use bruits to diagnose how severely an artery is stenosed without using an invasive method. The previous research revealed that more intensified acoustic fluctuations with higher frequency contents are induced by blood flow for more severely constricted arteries. However, most previous research has been conducted on two-dimensional configurations of artery with a variety of simplifications, which may exclude some of the crucial aspects in real stenosed arteries. In the present study, the generation and propagation of bruits from a realistic stenosed artery is simulated and analyzed in detail using a hydrodynamic/acoustic splitting method, where the flow field in a lumen is predicted by solving the incompressible Navier-Stokes equations using an immersed boundary method, while the acoustic field is predicted by linearized perturbed compressible equations.

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