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**Pulse propagation in the pulmonary arteries** NICHOLAS HILL, GARETH VAUGHAN, University of Glasgow, U.K., METTE OLUFSEN, North Carolina State University, U.S.A., MARTIN JOHNSON, Western Infirmary, Glasgow, U.K., CHRISTOPHER SAINSBURY, University of Glasgow, U.K. — The model of Olufsen [1,2] has been extended to study pulse propagation in the pulmonary circulation. The pulmonary arteries are treated as a bifurcating tree of compliant and tapering vessels. The model is divided into two coupled parts: the larger and smaller arteries. Blood flow and pressure in the larger arteries are predicted from a nonlinear 1D cross-sectional area-averaged model for a Newtonian fluid in an elastic tube. The initial cardiac output is obtained from magnetic resonance measurements. The smaller blood vessels are modelled as an asymmetric structured tree with specified area and asymmetry ratios between the parent and daughter arteries. Womersley's theory gives the wave equation in the frequency domain for the 1D flow in these smaller vessels, resulting in a linear system. The impedances of the smallest vessels are set to a constant and then back-calculation gives the required outflow boundary condition for the Navier-Stokes equations in the larger vessels. The number of generations of blood vessels, and the compliance of the arterial wall are shown to affect both the systolic and diastolic pressures. [1] Olufsen MS et al. Ann Biomed Eng. 2000;28:1281-99. [2] Olufsen MS. Am J Physiol. 1999;276:H257-68.

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