An experimental study of pulsatile flow through compliant tubes
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investigation is made into transitional behaviors and instability of oscillatory input
flows through elastic tubes, a problem with applications to hemodynamics and flows
in the pulmonary system. Sinusoidal input flow is driven through a compliant sil-
icone model in a series of experiments to investigate the effects of wall motion. A
novel mechanism allows active control and feedback over the pressure on the tube
exterior. By comparing the pressure within and outside of the tube and modifying
the exterior pressure accordingly, the tube is inflated in a controlled manner without
altering the input flow. In these experiments, the tube wall is deformed sinusoidally
with an amplitude of approximately ten percent of its radius. Experiments are con-
ducted using varying values of the parameters $\alpha = a \sqrt{\frac{\omega}{\nu}}$ and $\beta = \Delta x \sqrt{\frac{\omega}{\nu}}$ where $a$ is
the tube radius, $\omega$ the angular velocity of the input flow, $\nu$ the kinematic viscosity,
and $\Delta x$ the cross-stream averaged periodic displacement of a fluid particle under-
going pulsatile motion. For a given $\alpha$, it is found that indications of conditional
turbulence appear in this flow through elastic tubes at far lower values of $\beta$ and
thus at lower amplitudes of oscillation than are reported in the literature for flows
through rigid tubing.

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