

## Transverse Flows in Rapidly Oscillating Cylindrical Tubes

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Many physiological flows (e.g. blood flow in the veins and arteries or the flow of air in the pulmonary airways) are strongly affected by the interaction between the fluid flow and the vessel wall elasticity. In many applications this interaction causes the development of large-amplitude self-excited oscillations (e.g. wheezing during forced expiration). Motivated by this problem, we analyse the flows that develop in the cross sections of fluid-conveying pipes whose walls perform high-frequency oscillations. Using numerical and asymptotic methods, we show that the velocity perturbations induced by the wall oscillation are dominated by their transverse components. The transverse velocity field consists of an inviscid core flow and thin Stokes layers near the wall. The total viscous dissipation is shown to depend sensitively on the mode shapes of the wall oscillation.

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