Linear Stability and Growth of Disturbances in Weakly-Rarefied Pulsatile Flows  
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examine the response of pulsatile pipe flows to axisymmetric perturbations under  
weakly-rarefied flow conditions (slip regime) roughly defined by Knudsen numbers  
$Kn \leq 0.1$. Such perturbations can arise, for example, due to surface roughnesses  
on the solid boundaries. An Orr-Sommerfeld equation is derived and solved by  
means of a Galerkin projection onto the approximate functional space spanned by  
a finite set of eigenfunctions derived in the longwave limit of the Orr-Sommerfeld  
operator. For first-order slip boundary conditions, the results from Floquet stability  
analyses show that pulsatile slip flow is slightly more stable than the steady slip-flow  
for longwave disturbance; further, the stability characteristics are found to be only  
weakly-dependent on the Knudsen number. The flow structures corresponding to  
the largest energy growth are toroidal vortex tubes that are transported diffusively  
and convectively by the mean flow. The transient energy growth is found to slightly  
increase with the Knudsen number, indicating that the Orr-Sommerfeld operator for  
slip flow is more non-normal when compared to continuum-based no-slip flows. The  
impact of higher-order slip conditions at $O(Kn^2)$ will also be discussed.

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