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Transient stability analysis of steady and pulsatile aneurysmal flows DEBSHANKAR GHOSH, JOSHUA BRINKERHOFF, University of British Columbia — This study presents a computational investigation of the transient growth and convective instabilities in steady and pulsatile flow in a model abdominal aortic aneurysm with various expansion ratio and bulge lengths. Previous global and transient stability analyses have established fairly high critical Reynolds number for the system to become linearly unstable under steady conditions, according to physiological standards (Re_c>3000). However, the present study reveals transient instabilities in the system at much lower Reynolds numbers(100<Re<1000), even for steady flow. The linear and non-linear energy evolutions of these growth are presented and compared on the basis of size, Reynolds number and disturbance period (τ). Moreover, for some Reynolds numbers in the range considered, a weak, secondary transient growth develops after the temporal growth maximum is reached, creating a secondary growth envelope.The secondary mode is analyzed on the basis of the energy evolutions. Finally, a Floquet stability analysis of pulsatile conditions is discussed for aneurysms of varying sizes and Reynolds numbers. The results obtained help further the understanding of hemodynamics in aneurysms.

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