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**Optimum Heart Rate to Minimize Pulsatile External Cardiac Power** NIEMA PAHLEVAN, MORTEZA GHARIB, California Institute of Technology — The workload on the left ventricle is composed of steady and pulsatile components. Clinical investigations have confirmed that an abnormal pulsatile load plays an important role in the pathogenesis of left ventricular hypertrophy (LVH) and progression of LVH to congestive heart failure (CHF). The pulsatile load is the result of the complex dynamics of wave propagation and reflection in the compliant arterial vasculature. We hypothesize that aortic waves can be optimized to reduce the left ventricular (LV) pulsatile load. We used an in-vitro experimental approach to investigate our hypothesis. A unique hydraulic model was used for in-vitro experiments. This model has physical and dynamical properties similar to the heart-aorta system. Different compliant models of the artificial aorta were used to test the hypothesis under various aortic rigidities. Our results indicate that: i) there is an optimum heart rate that minimizes LV pulsatile power (this is in agreement with our previous computational study); ii) introducing an extra reflection site at the specific location along the aorta creates constructive wave conditions that reduce the LV pulsatile power.

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