Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Phasic Relationships among Hemodynamic Properties of Pulsatile Flow in Microcirculations[1] JUNG YEOP LEE, SANG JOON LEE, Dept. of Mech. Eng., POSTECH, Republic of Korea, BIOFLUID AND BIOMIMIC RESEARCH CENTER TEAM — Pulsatile blood flows in *omphalo-mesenteric* arteries of HH-stage 18 chicken embryos are measured using a time-resolved particle image velocimetry (PIV) technique to obtain hemodynamic information in microcirculations and compare hemodynamic properties of pulsatile blood flows. Due to the intrinsic features of pulsatile flow and complicated vessel network of microcirculation, an *out-of-phase* motion of blood occurs in nearby vessel segments of bifurcations. This is mainly attributed to the morphological characteristics and peripheral resistance of vasculature. The *out-of-phase* motion is quantitatively identified using the one-dimensional temporal cross-correlation function. This cross-correlation function is extended to establish the phasic relationships among hemodynamic properties such as velocity, shear rate, and acceleration. Velocity and shear rate are almost *in phase*, as predicted theoretically. On the other hand, velocity (or shear rate) shows an almost 180° *out-of-phase* against acceleration, which is quite larger than the theoretically predicted value.

[1]This work was supported by Creative Research Initiatives (Diagnosis of Biofluid Flow Phenomena and Biomimic Research) of MEST/KOSEF.

Jung Yeop Lee
Dept. of Mech. Eng., POSTECH, Republic of Korea

Date submitted: 10 Aug 2009 Electronic form version 1.4