

Mechanical Engineering Seminar Series

March 18, 2025, 11:00AM

E-203E, Dean's Conference Room

**Title: Exploring Cardiovascular Fluid Dynamics with Advanced
Time-Resolved 3D Particle Tracking**

Dr. Huang Chen

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Abstract: Many cardiovascular flows, including those past aortic valves or within cerebral aneurysms, exhibit complex three-dimensional flow patterns. It is difficult to capture them accurately with traditional two-dimensional in vitro measurement techniques. Furthermore, accurately determining residence time and three-dimensional stresses is key to quantifying the blood damage potential in medical devices. This talk will present some recent advancements in 3D time-resolved particle tracking methods for studying the fluid dynamics around heart valves and within cerebral aneurysms in vitro. Combined with novel algorithms, the three-dimensional data can be used to estimate 3D stresses and pressure, particle residence times, and the resulting level of blood damage. In addition, potential future applications of this technology and its broader implications for biomedical research will be discussed.

Bio: Dr. Huang Chen is an Assistant Professor in the Department of Mechanical Engineering at the University of Nevada, Las Vegas. He received his postdoctoral training in the Wallace H. Coulter Department of Biomedical Engineering at Georgia Institute of Technology after earning his PhD in Mechanical Engineering from Johns Hopkins University in 2019. His broad research interests revolve around fluid dynamics, with a focus on developing advanced optical measurement techniques to investigate complex flows and turbulence in blood-contacting medical devices. His current projects include studying flow patterns around heart valves, blood flow dynamics in ventricular assist devices, and the hemodynamics of novel blood pumps designed to support patients with failing Fontan circulation.