Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Numerical Flow Analysis of a Hydraulic Gear Pump YOGENDRA M. PANTA, Department of Mechanical Engineering, University of Nevada Las Vegas, HYUN W. KIM, HAZEL M. PIERSON, Department of Mechanical Engineering, Youngstown State University — The pressure that exists at the outlet port of a gear pump is a result of system load that was created by a resistance to the fluid flow. However, the flow pattern created inside an external gear pump by the motion of two oppositely rotating gears is deceptively complex, despite the simple geometry of the gear pump. The flow cannot be analyzed, based on a steady-state assumption that is usually employed to analyze turbo-machinery although the flow is essentially steady. Only the time-dependent, transient analysis with moving dynamic meshing technique can predict the motion of the fluid flow against the very high adverse pressure distribution. Although the complexity of analysis is inherent in all positive displacement pumps, gear pumps pose an exceptional challenge in modeling due to the fact that there are two rotating components that are housed within a stationary casing and the gears must be in contact with each other all the time. Fluent, commercially available computational fluid dynamics (CFD) software was used to analyze the flow of the gear pump. The investigation done by CFD produced significant information on flow patterns, velocity and pressure fields, and flow rates.

Yogendra M. Panta
Department of Mechanical Engineering, University of Nevada Las Vegas

Date submitted: 13 Sep 2007 Electronic form version 1.4