Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Fourier Transform Analysis of Pressure Fluctuations Due to Microscale Phase Change BRENDA HAENDLER, ALBERT PISANO, DORIAN LIEPMANN, University of California, Berkeley — Microscale boiling in channels smaller than the critical bubble radius results in an abrupt change from liquid to vapor. This abrupt change creates a diameter spanning meniscus when boiling pure fluids or mixtures of like fluids. Pressure changes in constant cross section microchannels due to the periodic movement back and forth of the phase change meniscus are measured for a variety of flow conditions. While there has been extensive research using water as the working fluid for electronics cooling applications, focus is placed on using commonly available fuels as the working fluid for portable power applications. A discrete Fourier transform is performed on the pressure data to determine the dominant frequencies in the signal and their relative strengths. Critical trends are discussed comparing both the frequency and the amplitude of the pressure spikes for a variety of temperatures, flow rates, working fluids, and channel diameters. The results of these trends give insight into how the fluid properties change the pressure signature, for a given set of flow conditions.

Brenda Haendler
University of California, Berkeley

Date submitted: 12 Aug 2005 Electronic form version 1.4