



### INFRARED PHOTOGRAPHS OF A GAS LOADED FLAT HEAT PIPE

M. Cerza

Mechanical Engineering Department, U.S. Naval Academy, Annapolis, Maryland

A large, gas loaded, flat heat pipe was videographed at horizontal and vertical orientations with an infrared video camera. The heat pipe was fabricated from sheets of Monel R-400 and Monel screen and measured 1.22 m×0.30 m×0.01127 m. The heat pipe evaporator section consisted of a 0.305 m×0.305 m area (one heated side) while the side opposite the heated section was insulated. The remaining area of the heat pipe served as the condenser which was videographed. In the horizontal orientation, the heated section was on the bottom. In the vertical orientation, the evaporator was aligned below the condenser. The first row sequence of photographs (horizontal)

depict the effects of a noncondensable gas at heat inputs between 200 to 800 W. As the heat input is increased, vapor compresses the gas back activating more condenser area. In the vertical orientation (second row), the noncondensable gas is seen to sink down into the central portion of the heat pipe, while water vapor rises up the edges of the heat pipe. The last two rows (vertical orientation) depict a time sequence which shows transient condensation oscillations caused by buoyancy and diffusion effects of the air and water vapor. The condensing vapor front was seen to switch from side to side. Temperature is in Celsius.