

XVI. ENERGY CONVERSION RESEARCH*

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A. STATUS OF RESEARCH

1. ALKALI-METAL VAPOR STUDIES

As we have noted in Quarterly Progress Report No. 85 (page 217), we have concluded that it is not feasible to attain nonequilibrium ionization by electron heating in a wet alkali vapor. A further conclusion which has been drawn from recent theoretical work is that such ionization strongly inhibits nucleation, and hence condensation, in a supersaturated vapor. Essentially, this is due to the tendency of the droplet temperature to equilibrate with the electron temperature, rather than with the gas temperature.

2. NONEQUILIBRIUM GENERATOR

Several experiments have been conducted with pre-ionization during this quarter. Although there has been some difficulty in obtaining reliable pre-ionizer performance, the results are very encouraging. The transverse current per electrode pair at short circuit increased from approximately 1 amp ($.14 \text{ amp/cm}^2$) at the inlet to 27 amp (4 amp/cm^2) beyond the center of the channel. The Hall electric field was everywhere much less than the ideal value, but increased from 200 vm^{-1} at open circuit to 600 vm^{-1} as short circuit was approached. Correcting for this small Hall field, we find a scalar conductivity of approximately 200 mho m^{-1} near the center of the channel. The value expected at inlet to the channel with pre-ionization was approximately 10 mho m^{-1} , and this is consistent with the measured currents in the first few electrode pairs.

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*This work was supported by the U. S. Air Force (Research and Technology Division) under Contract F33615-67-C-1148 with the Air Force Aero Propulsion Laboratory, Wright-Patterson Air Force Base, Ohio.

