TABLE III

VALUES OF CRITICAL HEAT CURRENT DENSITY $\bar{q}_c$ AND CORRESPONDING FLUID VELOCITIES[a]

	T_0(°K)	T_1(°K)	$\bar{q}_c$ (watt cm^{-2})	$\bar{v}^0_{n,c}$ (cm sec^{-1})	$\bar{v}^0_{s,c}$ (cm sec^{-1})	$\bar{v}^1_{n,c}$ (cm sec^{-1})	$\bar{v}^1_{s,c}$ (cm sec^{-1})
Slit III′ $d = 3.36\ \mu$							
	1.200	1.590	0.96	105	2.9	14.9	2.8
	1.400	1.621	1.15	41.5	3.4	15.7	3.4
	1.600	1.711	1.58	23.5	4.7	15.2	4.9
	1.800	1.847	2.15	15.0	6.8	12.8	7.2
	2.000	2.014	1.53	5.4	7.4	5.3	8.3
	2.100	2.106	0.84	2.2	6.6	2.1	6.8
Slit I $d = 2.12\ \mu$							
	1.400	1.787	2.30	83	6.7	16.8	7.3
	1.600	1.794	2.02	30	6.0	14.3	6.4
	1.800	1.871	1.61	11.3	5.1	8.9	5.7
	2.000	2.037	1.93	6.9	9.5	6.1	10.9
	2.100	2.122	1.54	4.0	12.0	3.7	15.3

[a] The velocities given here are the absolute values averaged over the cross section of the slit assuming laminar flow. The maximum velocity in the channel is then given as $\frac{3}{2}$ times the average velocity. The average relative velocity $\bar{v}_{r,c}$ may be given by $\bar{v}_{s,c} + \bar{v}_{n,c}$. The superscripts 0 and 1 refer to velocities obtained at T_0 and T_1, respectively.

sec). Vortices formed as a result of the flow are associated with the superfluid and are essentially removed from participation in superflow. This effective depletion of the superfluid fraction causes the remaining superfluid to flow more rapidly, thereby creating more vortices. The result is a sort of runaway process which ends in the "self-destruction" of superfluidity through complete conversion to vortex states. From this we would conclude that in small slits the critical velocity does not approach zero at T_λ but remains finite and that $\bar{v}_s$ increases until the superfluid state is suddenly destroyed by the vortex catastrophe. It is not clear at this time whether the same argument may be applied to the results of Atkins *et al.* (*28*) and Seki and Dickson (*29*) who have observed the onset of superfluidity in isothermal flow through channels with $d < 10^{-6}$ cm to be at temperatures considerably below T_λ.

VI. CONCLUSION

Although a number of thermohydrodynamical sets of equations have been applied to the flow of liquid He II, no single set has yet been constructed which completely describes the observed behavior of this quantum liquid. The two-fluid equations including the Gorter-Mellink mutual friction term as interpreted