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DISCUSSION

J. Z. Lichtman¹ (written discussion)—The physical features of the erosion of the rotating disk specimens observed and described by the author are identical to those observed in other high velocity erosion systems, both in the laboratory and in service.²⁻⁷ These systems included rotating disk and axial flow systems, pump impellers, propellers, and water brakes. It was suggested^{2,4} that the features of the eroded region are related to re-entrant flows associated with the cyclic cavitation cloud, and scouring of the microimpact-damaged surface by the high velocity re-entrant flow. The directional aspects of the damage in the rotating systems may be related to the centrifugal flows and resultant deviation of the cavitation cloud flow regime from the tangential direction. The radial flow component then would cause re-entrant flow in a direction which would result in the observed crevices and scoured margins. Such directional deviations are not observed in the damage associated with an axial flow system.⁵ This hypothetical analysis suggests the need for further study of the highly complex flow conditions associated with high speed and vibratory cavitation. Such investigations would contribute to a more complete understanding of the erosion process, which currently is associated primarily with the collapse of the cavitation bubble and resultant microimpact damage.

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² Lichtman, J. Z., "Possible Contributions of Reentrant Flow tc Cavitation Erosion," ASME Paper 62–HYD–3, American Society of Mechanical Engineers.

⁴Lichtman, J. Z., "Discussion," *Transactions*, Society of Naval Architects and Marine Engineers, Vol. 73, 1965, pp. 279–281.

⁵ Lichtman, J. Z., "Discussion," ASME 1967 Cavitation Forum, American Society of Mechanical Engineers, pp. 40, 41.

⁶ Kallas, D. H. and Lichtman, J. Z., "Cavitation Erosion," *Environmental Effects on Polymeric Materials*, Vol. 1, Rosato, D. V. and Schwartz, R. T., eds., Interscience, New York, 1968, Chapter 2, pp. 223–280.

⁷ Morgan, W. B. and Lichtman, J. Z., "Cavitation Effects on Marine Devices," *Cavitation State of Knowledge*, Robertson, J. M. and Wislicenus, G. F., eds, American Society of Mechanical Engineers, New York, 1969, Fig. 10, p. 206.

⁸ Lichtman, J. Z. and Weingram, E. R., "The Use of a Rotating Disk Apparatus in Determining Cavitation Erosion Resistance of Materials," ASME Symposium on Cavitation Research Facilities and Techniques, May 1964, American Society of Mechanical Engineers, 1964, pp. 185-196.