

Technical Comments

Comment on "Penetration of a High-Velocity Gas Stream by a Water Jet"

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IN a paper by Geery and Margetts¹ reference is made to some empirical correlations by Chelko² and Fenn³ and the need for a correlation for the penetration of jets of a larger diameter into an airstream. This need is partly justified by the discrepancy of predicted values in an extrapolated regime of current interest. In their paper one reference is made to a theoretical study.⁴

Generally confidence in empirical correlations decreases as the regime of interest differs from that for which the correlation is obtained. Theory, which also agrees with available data, may justify some confidence. In Ref. 5, theoretical expressions are developed for liquid jets penetrating a gas stream. Among other things it is pointed out that there are at least two distinct phenomenological regimes and that the data of Fenn³ are primarily in one regime (capillary wave region) while the data of Chelko² are in another (acceleration wave region). The data of Ref. 1 appear to be in the acceleration wave region and comparison may be made with the expressions developed for this regime in Ref. 5 and which agree reasonably well with the data of Chelko as well as data obtained by other investigators (these are summarized in Ref. 5) over a rather wide range of parameters (but not large diameter jets).

References

- ¹ Geery, E. L. and Margetts, M. J., "Penetration of a High Velocity Gas Stream by a Water Jet," *Journal of Spacecraft and Rockets*, Vol. 6, No. 1, Jan. 1969, pp. 79-81.

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- ² Chelko, L. J., "Penetration of Liquid Jets Into a High Velocity Air Stream," RME SOF21, Aug. 21, 1950, NACA.

- ³ Fenn, D. B., "Correlation of Isothermal Contours Formed by Penetration of Jet of Liquid Ammonia Directed Normal to an Airstream," RM E 53, J 08, Feb. 3, 1954, NACA

- ⁴ Forde, J. M., Molder, S., Szpiro, E. J., "Secondary Liquid Injection Into a Supersonic Airstream," *Journal of Spacecraft and Rockets*, Vol. 3, No. 8, Aug. 1966, pp. 1172-1176.

- ⁵ Adelberg, M., "Breakup Rate and Penetration of a Liquid Jet in a Gas Stream," *AIAA Journal*, Vol. 5, No. 8, Aug. 1967, pp. 1408-1415 (see Ref. 6 for Errata).

- ⁶ Adelberg, M., "Mean Drop Size Resulting from the Injection of a Liquid Jet into a High Speed Gas Stream," *AIAA Journal*, Vol. 6, No. 6, June 1968, pp. 1143-1147.

Erratum: "Hopping Transporters for Lunar Exploration"

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