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Turbulence intensity's effect on liquid jet breakup from long circular pipes BEN TRETTEL, OFODIKE EZEKOYE, University of Texas at Austin — Long pipes which produce fully developed flow are frequently used as a nozzle in jet breakup research. We compiled experimental data from over 20 pipe jet studies for many breakup quantities and developed correlations for these quantities based on existing theories and our own theories. Previous experimental studies often had confounding between some variables (e.g., the Reynolds and Weber numbers), neglected important quantities (e.g., the turbulence intensity), or made apples to oranges comparisons (e.g., different nozzles). By independently tracking the Reynolds number, Weber number, density ratio, and turbulence intensity, and focusing only on pipe jets to keep other variables nearly constant, we minimize these issues. Turbulence is a cause of jet breakup, yet there is little quantitative research on this due to the difficulty of turbulence measurements in free surface flows. To avoid those difficulties, we exploited the fact that adjusting the roughness of a long pipe allows one to quantifiably control the turbulence intensity. We correlated turbulence intensity as a function of the friction factor. Data for rough pipes was used to include turbulence intensity in our study. Comparisons were made with theories for the effect of turbulence intensity on breakup.

Ben Trettel
University of Texas at Austin

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