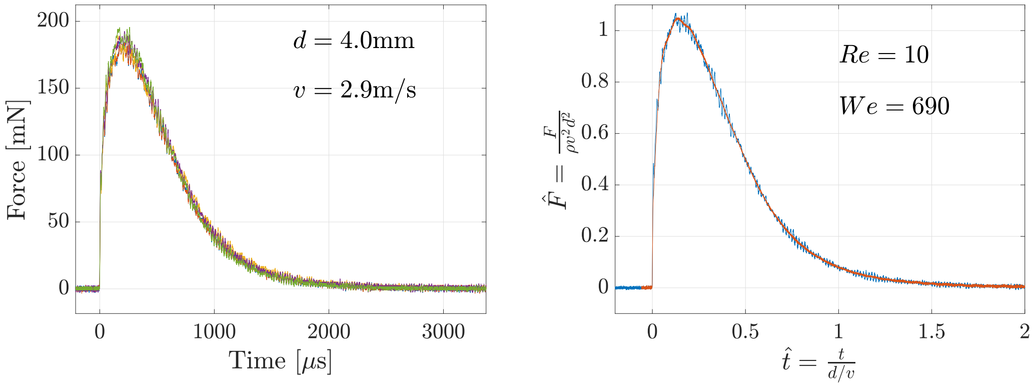

FIGURE 1. Test condition 1.

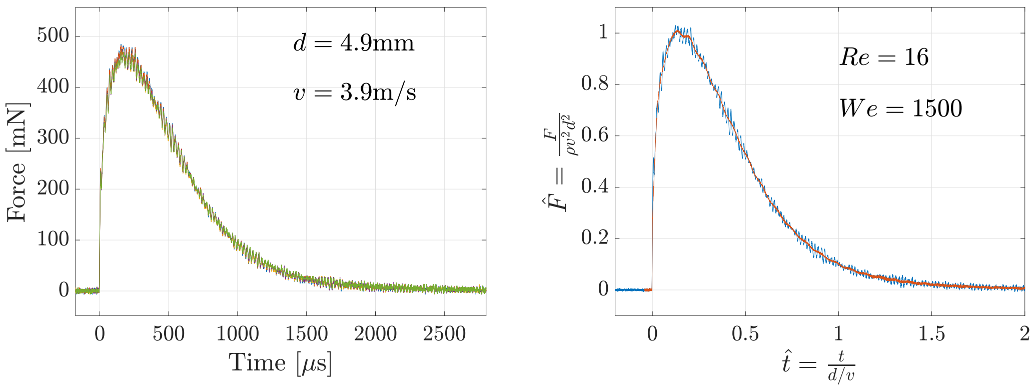

FIGURE 2. Test condition 2.

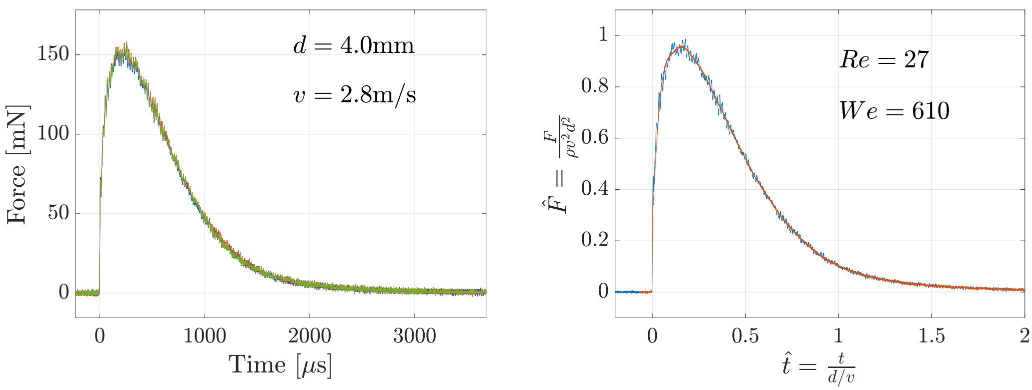

FIGURE 3. Test condition 3.

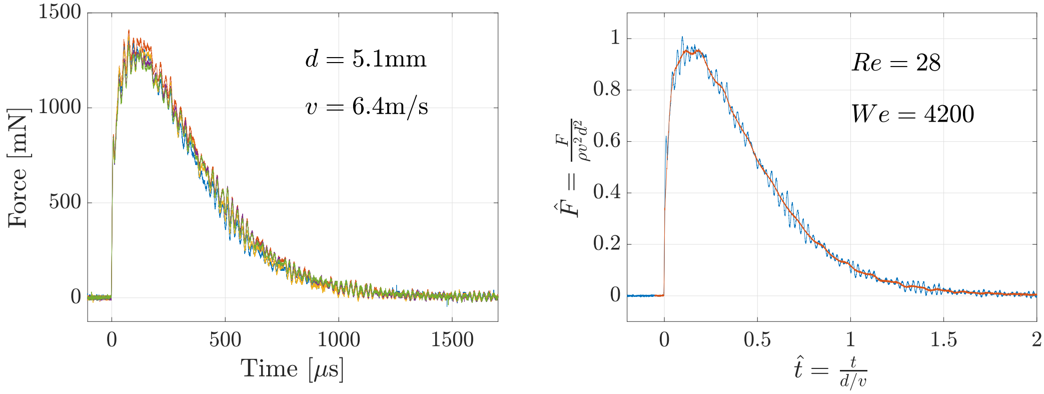

FIGURE 4. Test condition 4.

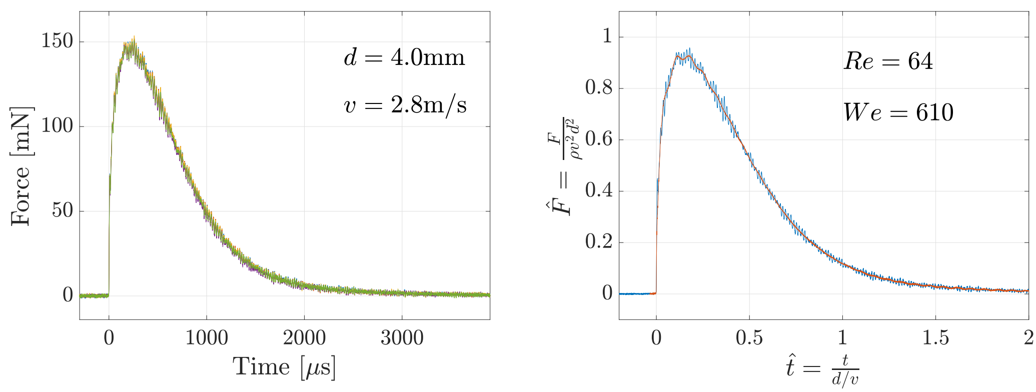

FIGURE 5. Test condition 5.

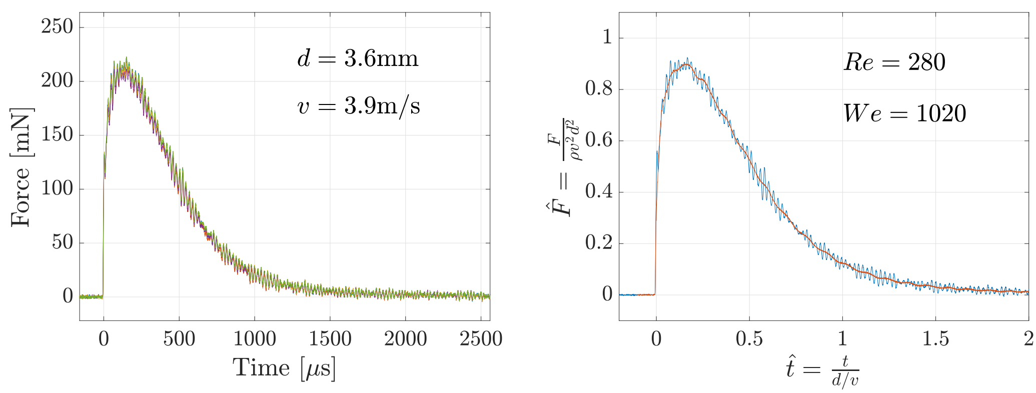

FIGURE 6. Test condition 6.

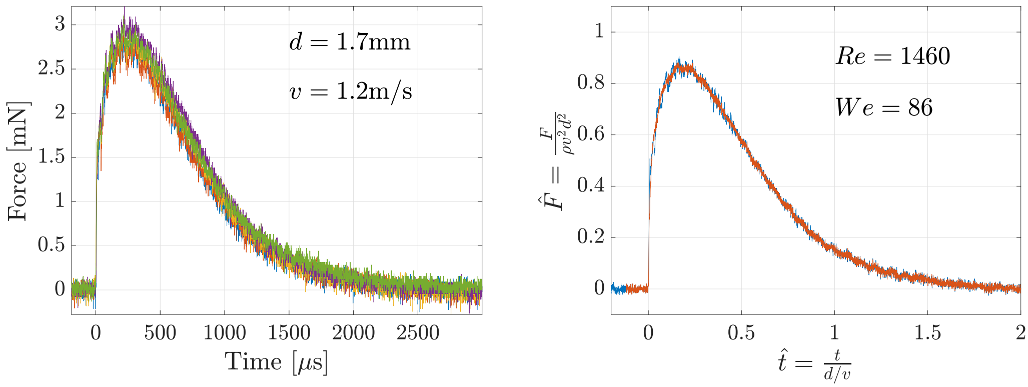

FIGURE 7. Test condition 7.

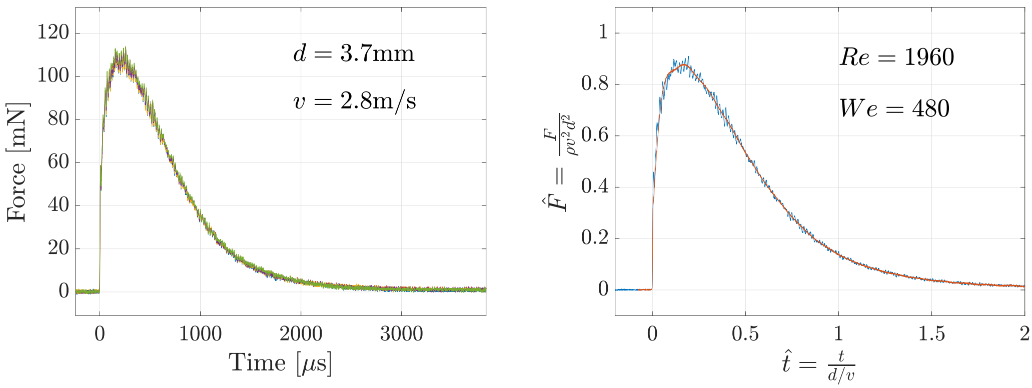

FIGURE 8. Test condition 8.

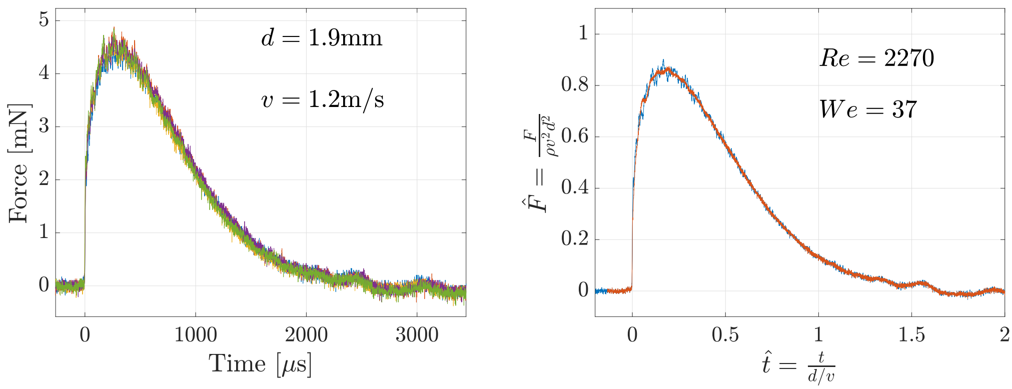

FIGURE 9. Test condition 9.

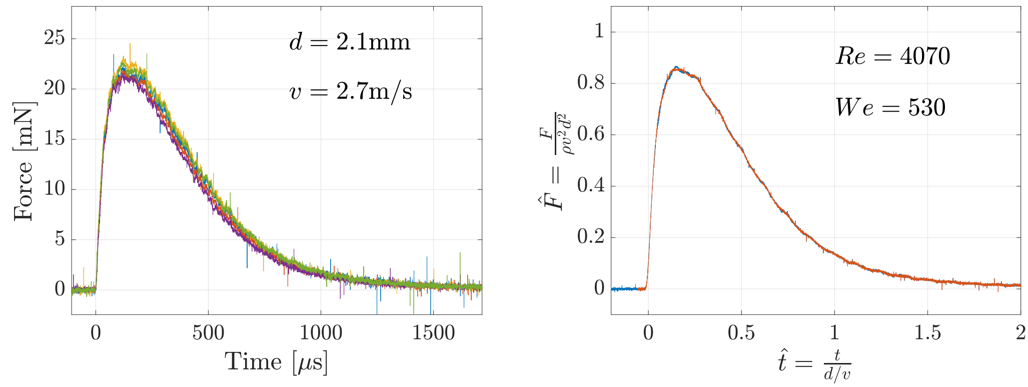

FIGURE 10. Test condition 10.

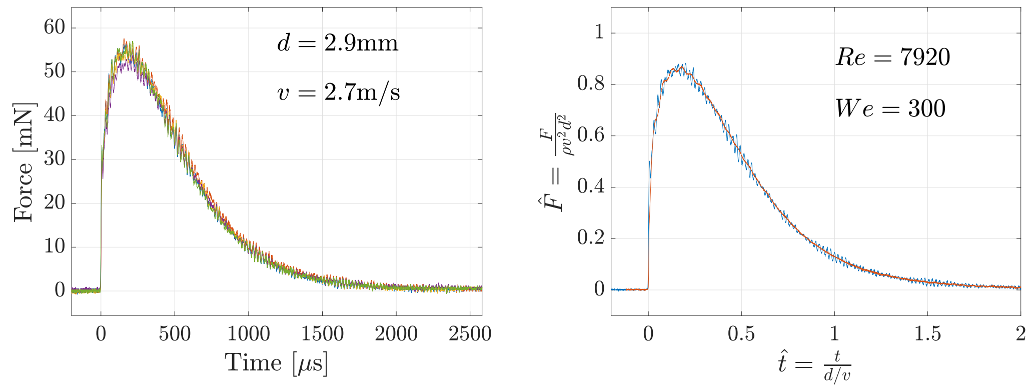

FIGURE 11. Test condition 11.

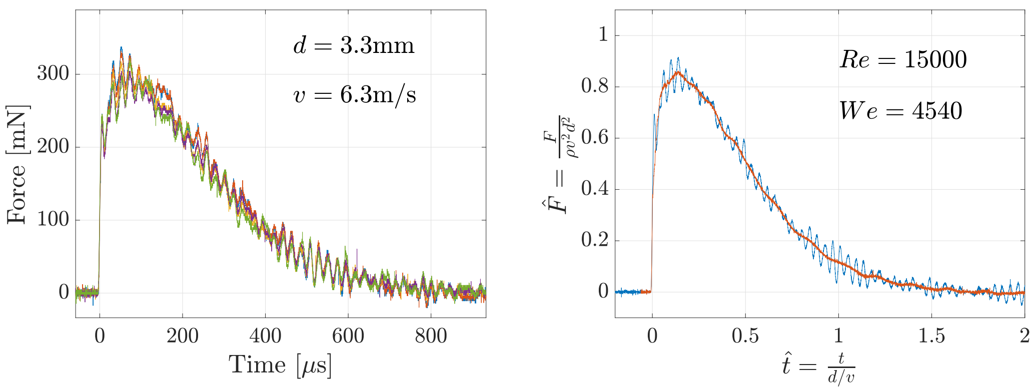

FIGURE 12. Test condition 12.

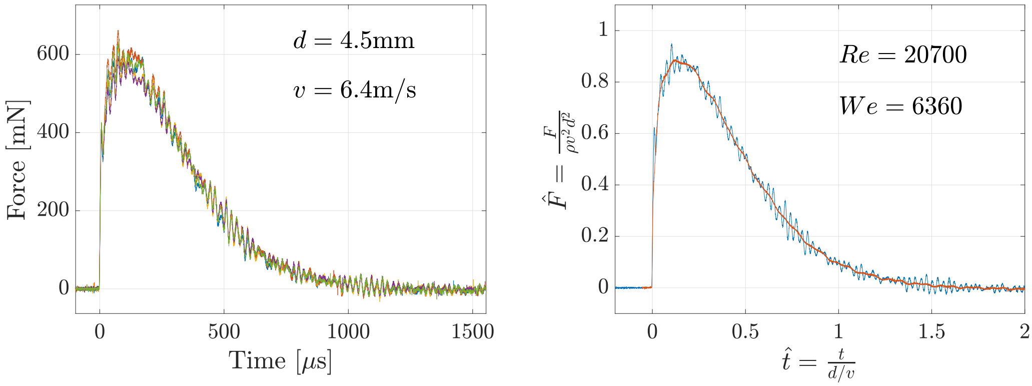

FIGURE 13. Test condition 13.

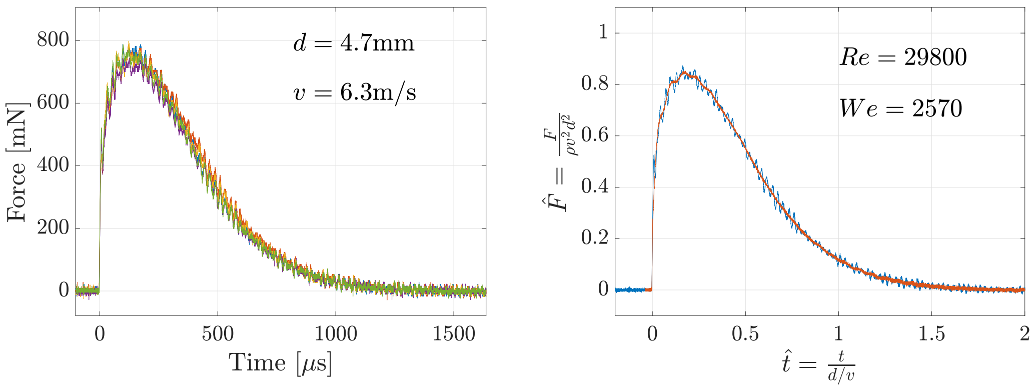

FIGURE 14. Test condition 14.

On this page, we estimate the experimental uncertainty in the peak force of test condition 11. With respect to all test conditions, test condition 11 has a medium sized droplet diameter and medium impact velocity and thus, provides an intermediate-sense of the experiments' uncertainty. In this context, the estimation for uncertainty stems from the normalized force:

$$\hat{F} = \frac{F}{\rho v^2 d^2} \tag{0.1}$$

where F is the measured force, ρ is the density, v is the measured impact velocity and d is the droplet diameter. With equation 0.1, the experimental uncertainty in the force measurements is estimated using the Taylor Series Method (TSM), given by:

$$U_{\hat{F}} = \sqrt{\sum_{i=1}^{4} \left(\frac{\partial \hat{F}}{\partial x_i}\right)^2 U_i^2}, \tag{0.2}$$

where the x_i's are the variables ρ, v, d, and F. The U_i's are the uncertainties in each variable. Taking the derivatives of $\hat{F}$ with respect to the variables, x_i, substituting into equation 0.2, and then dividing by $\hat{F}^2$, yields:

$$\left(\frac{U_{\hat{F}}}{\hat{F}}\right)^2 = \left(\frac{U_\rho}{\rho}\right)^2 + 4\left(\frac{U_v}{v}\right)^2 + 4\left(\frac{U_d}{d}\right)^2 + \left(\frac{U_F}{F}\right)^2 \tag{0.3}$$

Equation 0.3 provides a normalized representation of the individual uncertainty contributions from each variable. The uncertainty in the normalized force is dependent on the variables' uncertainty and the measured variable values. To obtain the uncertainty in each variable U_i, we adopt a statistics-based estimation. For the force, U_F, we take the root mean square of the base-line noise, before the droplet has impacted the force sensor. For test condition 11, this is 0.241 mN. Of the five trials of the test condition, the difference between the maximum and minimum recorded velocity is 0.05m s^{-1}, thus we assign $U_v = 0.05\text{m s}^{-1}$ as a statistical-based estimation for the velocity uncertainty. In a similar fashion, the difference between the maximum and minimum recorded diameter is 0.0856mm, and thus $U_d = 0.0856\text{mm}$. The density is assumed to be exact, therefore $U_\rho = 0$. With these estimations of variable uncertainty, and with $\rho = 998\text{kg m}^{-3}$, $v = 2.73\text{m s}^{-1}$, $d = 2.91\text{mm}$, $F = 54.8\text{mN}$, and $\hat{F} = 0.870$, equation 0.3 yields:

$$\frac{U_{\hat{F}}}{\hat{F}} = 6.99\% \tag{0.4}$$

From equation 0.4, the non-dimensional peak force is 0.870 ± 0.061, and in its dimensional form, the peak force is 54.8 ± 3.8mN.