Korkut and Aksay Reply: Recently, we showed that gas ionization can enhance the stability of electrohydrodynamic (EHD) jets [1] and, when ionization effects are not recognized, the stability theories overestimate the nonaxisymmetric instability growth rates. Gamero-Castaño's Comment [2] focuses on the interpretation of (A) the prior literature and (B) our experimental results. We categorize our reply in this order.

(A) Prior literature.—(i) Gamero-Castaño states that our statement "...experimental conditions leading to the disappearance of the whipping instability are not understood" is erroneous. The confusion is due to the terminology differences. In the electrospraying community, the "disappearance of the nonaxisymmetric disturbances" refers to growth rates of the nonaxisymmetric disturbances being lower than those for the axisymmetric ones along the jet. In Ref. [1], the growth rates of nonaxisymmetric disturbances are larger compared to those of axisymmetric ones. The Taylor number of 3.2 estimated for the glycerol jet [using Eq. (1) of Ref. [3]] without considering charge neutralization is much larger than the range (0.3–0.4) to which Gamero-Castaño refers; yet the jets shown in Figs. 3(a) and 3(c) of Ref. [1] appear stable due to their low nonaxisymmetric instability growth rates. References [4,5] from [2] do not provide a theory for the growth rates of nonaxisymmetric disturbances and thus are not directly related to the discussion of Ref. [1]. (ii) Gamero-Castaño claims that our interpretation of Taylor's work is erroneous and there is no discrepancy between theory and experiments. Taylor [6] wrote: "These jets were so steady that an exposure of 1 s or more would reveal sharply a straight jet sometimes only 0.002 cm in diameter." Clearly, Taylor was surprised about the stability of the EHD jets. Although a quantitative comparison between theory and experiments for the EHD jets was not performed by Taylor himself, this discrepancy was later acknowledged [7] by a leading group in the field.

(B) The experimental results.—(i) Gamero-Castaño states that we "do not provide enough data for estimating the Taylor numbers" and also claims that "the accuracy of the unreported Taylor numbers is poor." The data for glycerol [1] result in an overestimated Taylor number, since the measured electrical currents are affected by the gas phase. This, along with the unaccounted neutralized charge, is the main reason for the overestimation of instability growth rates. Without knowing the charging level of the jets after neutralization, accurate Taylor numbers cannot be determined; hence, his question "does a reduction in the charging level of these jets by, for example, a factor of 2 lower the theoretical growth rate of lateral oscillations by a factor of 1000?" is unclear to us. (ii) Gamero-Castaño states that the dominant charge transport mechanism for the jets in Figs. 1 and 2 is different and hence they should not be used to explain the same phenomenon. Despite differences in the conduction current, both jets show the same characteristics: They generate ionized gas and are stabilized as a result. Moreover, the negligible conduction current assumption was not used in any estimation regarding Fig. 1. (iii) Gamero-Castaño questions the applicability of a linear stability theory for our experiments. The amplitude of the disturbances [e.g., Fig. 2(a) of Ref. [1]] are as small as a few jet diameters. The length of the "straight" section of the jet, which should be determined by the growth rates of infinitesimally small disturbances, agrees with the lengths found using experimentally determined instability growth rates. Hence, the linear stability theory gives a reasonable approximation of our experiments. (iv) Finally, in Ref. [1], jet stabilization by gas discharges is discussed not only based on the instability growth rates but also, more importantly, by giving experimental evidence of stabilization under different atmospheres. The stabilizing nature of gas discharges is clearly illustrated.

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