DISCUSSION

CONCERNING "THE MECHANISM OF DECAY OF A JET INTO LARGE DROPS"

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In "Journal of Engineering Physics," Vol. 10, No. 5, 1966, I. Khomyak published a critical note on our article "The mechanism of decay of jet into large drops," which appeared in vol. 8, no. 4, of that journal in 1965.

Khomyak points out that the perturbations of jet cross sections considered by Rayleigh and discussed in the above-mentioned article are not oscillations. This is correct, but, as noted in the article, this is the expression that has been and continues to be employed in the literature.

Unfortunately, our critic Khomyak himself repeats the same erroneous representation of the perturbations of a jet as oscillations by assigning this character to all perturbations for which $kR_0 > 1$ and taking the propagation velocity of any perturbations along the jet as the wave oscillation velocity in accordance with expression (5).

We stress once more the basic position of our article that the perturbations of the jet sections are not independent of each other; however, the relation between neighboring perturbations has the character not of elastic wave oscillations but of irreversible overflows of liquid from points of contraction to points of expansion under the influence of Laplace forces. The same forces are also responsible for the propagation of alternate expansions and contractions of the sections along the jet. In fact, only special external influences can stimulate the occurrence of a new independent perturbation in neighboring parts with greater energy than the influence of the adjacent distorted section of the jet itself.

By means of high-speed motion-picture photography we have established the irreversibility of the growth of each expansion or contraction of neighboring real cross-sections of a spontaneously decaying jet, without any oscillation of the sections, and this new experimental material is in good agreement with our arguments concerning the low probability of elastic oscillations of the sections of liquid jets.

Of course, in the sense of the preferred growth and formation of perturbations affecting precisely a certain length of the jet, Plateau and Rayleigh are quite right. But even here it should perhaps be mentioned that the assumed wave-type shape of the perturbation does not at all imply that its motion is necessarily oscillatory.