source of uncertainty: the flutter that affected the rotation of the camera shutters. When the trail covered two or more cycles of the flutter, it was possible to eliminate its effect fairly well, but for shorter trails a correction was impossible (Whipple and Jacchia, 1957). Moreover, the elongated and fuzzy form of the dashes, particularly when wake or blending or both together are present, makes it impossible to know exactly to what the deceleration refers. It can never be too much emphasized that very often in meteor physics the quantities determined from the observations do not correspond strictly with those that enter the equations of the theory.

Another source of error in τ_p/ρ_m^2 is the atmospheric density. We should not forget that local transient fluctuations of the atmospheric density may appreciably affect the results, since τ_p/ρ_m^2 is inversely proportional to the third power of ρ_a.

Investigation of the dependence of τ on mass.—Let us now examine the problem of the dependence of the luminous efficiency on the mass of meteoroids. By assuming that τ_p depends on some power P of the initial mass, we can write

$$\tau_p = K_1 v^{n_1} m_\infty^P. \tag{23}$$

By using equation (2) we get:

$$\tau_p = K v^{\frac{n_1-2P}{1+P}} E_\infty^{\frac{P}{1+P}}, \tag{24}$$

where $\frac{n_1-2P}{1+P}=n$. Equation (24) shows that we can investigate the dependence of τ_p on m_∞ by studying the correlation between τ_p and the total integrated brightness E_∞. This is true even if we assume that τ_p is proportional to the power P of the instantaneous mass. Therefore, Jacchia's Super-Schmidt sporadic meteors have been arranged in three equally populated groups in order of increasing ϵ_∞ ($\epsilon_\infty = \log E_\infty$). The results, which are listed in table 7 (a and b), clearly show that τ_p does not depend on the meteor mass. We cannot check whether the exponent n keeps the same value when the brightness changes by using the least-squares method for these three groups, because each group corresponds to a different mean velocity and the actual spread in v becomes too small. Only the intermediate group has roughly the same velocity distribution over the entire sample. Most of the meteors that belong to the faintest group are very slow, while the brightest group contains a great part of the fast meteors. It is possible, however, to arrange the sporadic meteors in three groups of different brightness but of the same distribution in velocity. The results obtained with the least-squares method show that n decreases as we go from the faint meteors to the bright ones. This result disagrees with the current opinions of McKinley (1961), quoted above, and with Öpik's theory, according to which n should decrease with brightness. The differences between $n=1$, as found for all the sporadic meteors together, and the single values corresponding to each group of brightness could, however, hardly be said to be significant, since they are of the same order as the probable error involved in these determinations. Moreover, the average deviations of one individual value of log τ_p/ρ_m^2 from the least-squares straight lines are just as large as that found in the general solution involving all the sporadic meteors. Study of figure 5, in which average values of log τ_p/ρ_m^2 taken in intervals of 10 kms^{-1} for each group are plotted, clearly shows that the variations of n given by the least-squares method certainly result more from accidental fluctuations than from a real difference in the behavior of τ_p as a function of v. But the final proof of the independence of n from the brightness is afforded by the analysis of the small-camera meteors. These meteors are much brighter than the Super-Schmidt meteors, since their average E_∞ is about 100 times the average E_∞ of the Super-Schmidt meteors. But the value of the exponent n of the small-camera meteors turns out to be very close to 1, as we will see later.

The possibility of a dependence of τ_p on the mass m_∞ has also been studied by means of the residuals Δ, defined as the difference between the values of log τ_p/ρ_m^2 obtained by the observational data and those obtained by the least-squares solution. Table 8 reports the average values of Δ for 10 groups of 25 meteors in order of increasing brightness. These results are also