external layers, subjected during the comet's life to a smaller pressure. We can therefore expect that short-period meteors have a greater solidity than long-period ones. Thus, it is easy to understand a difference in density among meteors with much different orbital characteristics, while it is difficult to find reasons for justifying a difference in composition.

We should expect a nonsystematic spread in the values of the density ρ_m among sporadic meteors. Taken together with the irregularity in the shape of the bodies, the observational errors and the effects of fragmentation, which will be discussed in detail later, this spread must give a wide scatter in the individual values of τ_p/ρ_m^2. In spite of this scatter, all of whose causes are random and unpredictable, we may expect to arrive at correct conclusions by taking averages of τ_p/ρ_m^2 in groups with a large number of meteors in the same range of velocities or better, with a least-squares solution for all the data.

Data and results

The value of n.—For the determination of n by the least-squares method it is convenient to put the dependence of τ_p on v in a logarithmic[6] form:

$$\log \frac{\tau_p}{\rho_m^2} = \log \frac{\tau_{op}}{\rho_m^2} + n \log v, \tag{15}$$

where v is $\bar{v}$. Of the 413 original Super-Schmidt meteors, 12 are not available for our purpose because some basic physical data are missing or because their precision is lower. Taking out all the meteors having a clearly anomalous log τ_p/ρ_m^2 leads us to eliminate from the analysis 40 meteors (10 percent of the total number), 36 of which are sporadic. Thus the analysis concerns 361 meteors, 247 sporadic and 114 shower. The least-squares method gives for the sporadic meteors $n = 1.52 \pm 0.15$. This result, however, is not to be considered final because of the difference in density between long-period meteors and those of the Jupiter family. Table 1[7] contains the uncorrected average values of

[6] In the following, log always indicates decimal logarithms.

[7] In table 1, as in the following tables, the numerical values are sometimes given, for mathematical purposes only, with one digit more than those really significant.

TABLE 1.—*Sporadic Super-Schmidt meteors: log τ_p/ρ_m^2 as a function of meteor velocity (no correction applied for the difference in density between short-period and long-period meteors).*

Velocity, v (10^5 cms^{-1})	log v	log τ_p/ρ_m^2	S.d. of mean	ϵ_∞	S.d. of mean	no.	w
10–15	6.130	−11.898	±0.311	−0.73	±0.13	10	4.82
15–20	6.245	−11.377	0.095	−0.42	0.07	52	4.96
20–25	6.347	−11.397	0.105	−0.51	0.06	45	4.74
25–30	6.436	−11.227	0.104	−0.47	0.07	40	4.37
30–35	6.505	−10.996	0.101	−0.20	0.09	24	5.09
35–40	6.572	−10.753	0.217	−0.46	0.13	10	3.69
40–45	6.633	−10.730	0.160	−0.46	0.08	12	3.73
45–50	6.678	−10.806	0.150	−0.07	0.18	8	4.67
50–55	6.720	−10.544	0.230	−0.27	0.16	6	3.17
55–60	6.760	−10.465	0.139	−0.17	0.16	10	3.34
60–65	6.791	−10.887	0.198	−0.41	0.09	13	2.82
65–70	6.829	−10.934	0.164	−0.26	0.07	12	2.70
70–75	6.854	−10.534	0.454	+0.06	0.21	5	3.23

The least-squares solution for mean values gives $n = 1.51 \pm 0.15$.
Correlation coefficient between mean values of log v and log $\tau_p/\rho_m^2 = 0.90$.

Results of the general least-squares solution and mean values of the basic quantities: $n = 1.52 \pm 0.15$; log $\tau_{op}/\rho_m^2 = -20.99 \pm 0.99$; a.d. $= 0.53$; no. of meteors $= 247$; log $v = 6.433 \pm 0.008$; log $\tau_p/\rho_m^2 = -11.182 \pm 0.031$; $\epsilon_\infty = -0.40 \pm 0.02$; $w = 4.35$, where $\epsilon_\infty = \log E_\infty$, and a.d. = average deviation of individual value of log τ_p/ρ_m^2 from the least-squares solution.