its angular velocity around this axis we have $\sin^2 \theta \cdot \dot{\phi} = c/e$.
If each line of force carried a unit mass at unit distance from
the origin the angular momentum of the mass would thus be
the same for all the lines of force.

An attempt made previously* to obtain the lines of force
when any system of charges or doublets is emitted from a
moving pole is vitiated by an unfortunate oversight. It
appears that Z cannot be made equal to unity as was assumed.
The differential equations to be solved are consequently of type

$$g(\sigma, \bar{\sigma}) \frac{d\sigma}{d\tau} = f'(\bar{\sigma}, \tau), \qquad g(\sigma, \bar{\sigma}) \frac{d\bar{\sigma}}{d\tau} = f'(\sigma, \tau),$$

where g is a function† whose form is independent of the emitted
system and consequently independent of the form of f'.

CALIFORNIA INSTITUTE OF TECHNOLOGY,
October, 1920.

SHORTER NOTICES.

Table de Charactéristiques de Base 30030, *donnant en un seul
coup d'oeil les facteurs premiers des nombres premiers avec*
30030 *et inférieurs à* 901,800,900. By ERNEST LEBON.
Tome I, Premier Fascicule. Paris, Gauthier-Villars, 1920.

To one who has spent eight years of his life in making a
factor-table for the first ten millions the plan to extend such
a table to the limit 901,800,900 seems like a rather serious
undertaking. If such a table were constructed according to
the plan devised by Burckhardt and employed by Dase and
Glaisher the number of pages would exceed one hundred
thousand, and with five hundred pages to the volume would
fill some two hundred volumes! If, as in the tables published
by the Carnegie Institute, the multiples of 2, 3, 5 and 7 were
omitted, and the pages somewhat enlarged to take care of the
large divisors certain to appear, the number of pages would be

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* *Proc. London Math. Soc.*, (2), vol. 18 (1919), p. 123, *Phil. Mag.*, vol.
34, Nov., 1917, p. 419. In the notation used in the last paper the equations
should be

$$g(\alpha, \beta) \frac{d\alpha}{d\tau} = f(\beta, \tau), \qquad g(\alpha, \beta) \frac{d\beta}{d\tau} = f(\alpha, \tau).$$

† In the case of a stationary pole, $g = (1 + \sigma\bar{\sigma})^{-2}$.

42,943, and the work would appear in 86 immense volumes!
M. Lebon's table omits multiples of 2, 3, 5, 7, 11, 13; but a
table of smallest divisors omitting such multiples, and con-
structed according to the extremely condensed plan of the
Carnegie tables would still run into some 34,594 pages, or 69
large volumes!

Furthermore, M. Lebon notes the inconvenience of tables
which give only the smallest divisors, and in his table proposes
to list all the divisors! Such a plan, followed out in factor-
tables of the kind already published, would certainly multiply
their bulk by two, and probably by five. This Table de
Charactéristiques is to take the place of three or four hundred
volumes of the most compactly arranged factor-tables yet
invented! If the author were not listed on the title page as
Agrégé de l'Université, Professeur honoraire de Mathématiques
au Lycée Charlemagne, Lauréat de l'Académie Français et de
l'Académie des Sciences; if he were not able to cite favorable
mention of it in the important mathematical societies of
France, Italy, Spain and America; if the persons presenting
his work before the various learned societies were not men
like Volterra, Appell, Rouche, Neuberg, Nielsen, Darboux;
if he had not been granted medals and prizes in recognition of
his work, one would be inclined to dismiss the undertaking
as absurd. With such a list of illustrious men and associa-
tions behind it one must take the publication seriously.

Of the 56 pages of tables contained in the Premier Fascicule
of Tome I the first 40 are devoted to numbers of the form
$Bk + 1$, where $B = 30030$, and give the factors of all such
numbers for values of k not greater than B. The table is not
arranged with increasing values of k, however, but with in-
creasing values of I where the number $Bk + 1 = I \cdot I'$. The
factorization of both I and of I' is given, and the corresponding
value of k is also listed. This table of 40 pages not only serves
to give the factors of all numbers not larger than B, but is also
used, as we shall see, in finding the factors of larger numbers.

The second table, called a "Table of Characteristics," gives
the factorization of numbers of the form $Bk + 1$ for k less
than B, arranged with increasing values of k. The Premier
Fascicule carries this table up only as far as $k = 4680$. There
are 14 pages in this table and when complete up to $k = B$ it
will cover some 90 pages altogether, unless the increasing
number and size of the factors necessitate wider spacing be-

tween the columns. This table, then, when complete, will serve to give the complete factorization of all numbers of the form $Bk + 1$ within the limits proposed for the table. A similar table, giving the factors of all numbers of the form $Bk + I$, where I is any one of the 5760 numbers less than, and prime to B, would complete the factor table, but as such an extension of the table would mean 518,400 pages, or over a thousand large volumes, M. Lebon has another plan to propose. He undertakes to throw any number of the form $B\kappa + I$ into the form $Bk + 1$. This is indeed not difficult. Multiply the number $n = B\kappa + I$ by I' where $I \cdot I' = Bk + 1$. An easy reduction gives $nI' = BK + 1$ where $K = \kappa I' + k$. If, now, K is less than B we can find the factorization of nI' in the table of 90 pages noted above, I' being obtainable for any I in the first little table of 40 pages. But since I' may have any value less than B, and κ also may have any value less than B it is clear that K may have any value less than $B \times B = 901,800,900$, "Avec le Tome II commencera la table des charactéristiques $K > 30029$." It is worth while to pause to examine the extent of this "Tome II."

It is not quite true that K takes all values less than this limiting number, because those which give primes may be omitted. The number of pages necessary for the whole table will be, however, approximately B times the number necessary for the table as far as $K = B$, that is to say 90 pages. A simple multiplication gives then, 2,702,700 as the approximate number of pages in "Tome II." Truly a stupendous volume! Equal to 5,405 volumes of 500 pages each!

The reviewer believes, from his own experience in such matters that one page a day for the computation alone would be exceedingly rapid work. Allowing 300 working days for the year, "Tome II" will be completed some 9,000 years from now! Those who are looking forward eagerly to the appearance of this volume will be pained to note that M. Lebon has received from the Academy a notice "qui provoque un arrêt dans les calculs":

"Le Conseil d'Administration, d'accord avec la Commission technique, a décidé, dans sa dernière séance, qu'il y avait lieu d'attendre, pour continuer ses subventions, que la partie déjà exécutée de votre travail fût imprimée."

<div align="right">D. N. LEHMER.</div>