its angular velocity around this axis we have \( \sin^2 \theta \cdot \phi = c/e \). 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

\[
g(\sigma, \bar{\sigma}) \frac{d\sigma}{d\tau} = f'(\sigma, \tau), \quad g(\sigma, \bar{\sigma}) \frac{d\bar{\sigma}}{d\tau} = f'(\sigma, \tau),
\]

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.*

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**SHORTER NOTICES.**

*Table de Charactêristiques 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.*


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


\[
g(\alpha, \beta) \frac{d\alpha}{d\tau} = f(\beta, \tau), \quad g(\alpha, \beta) \frac{d\beta}{d\tau} = f(\alpha, \tau).
\]

† 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 constructed 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 Française 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 associations 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 increasing 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 pro­
pose. He undertakes to throw any number of the form
$Bk + I$ into the form $Bk + 1$. This is indeed not difficult.
Multiply the number $n = Bk + I$ by $I'$ where $I' = Bk + 1$.
An easy reduction gives $nI' = BK + 1$ where $K = kI' + k$.
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 $k$ 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 caractéristiques $K > 30029$.” 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 stu­
pendous 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 appear­
ance 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.”

D. N. Lehmer.