

and moon, their apogees, the moon's nodes, and other quantities; and by the variety of combinations of which these admit, the terms become very numerous and complex. The magnitude of the terms depends also upon various circumstances; as the relative force of the sun and earth, the relative times of the solar and lunar revolutions, the eccentricities and inclinations of the two orbits. These are combined so as to give terms of different orders of magnitudes; and it depends upon the skill and perseverance of the mathematician how far he will continue this series of terms. For there is no limit to their number: and though the methods of which we have spoken do theoretically enable us to calculate as many terms as we please, the labor and the complexity of the operations are so serious that common calculators are stopped by them. None but very great mathematicians have been able to walk safely any considerable distance into this avenue,—so rapidly does it darken as we proceed. And even the possibility of doing what has been done, depends upon what we may call accidental circumstances; the smallness of the inclinations and eccentricities of the system, and the like. “If nature had not favored us in this way,” Lagrange used to say, “there would have been an end of the geometers in this problem.” The expected return of the comet of 1682 in 1759, gave a new interest to the problem, and Clairaut proceeded to calculate the case which was thus suggested. When this was treated by the methods which had succeeded for the moon, it offered no prospect of success, in consequence of the absence of the favorable circumstances just referred to, and, accordingly, Clairaut, after obtaining the six equations to which he reduces the solution,² adds, “Integrate them who can” (*Intègre maintenant qui pourra*). New methods of approximation were devised for this case.

The problem of three bodies was not prosecuted in consequence of its analytical beauty, or its intrinsic attraction; but its great difficulties were thus resolutely combated from necessity; because in no other way could the theory of universal gravitation be known to be true or made to be useful. The construction of *Tables of the Moon*, an object which offered a large pecuniary reward, as well as mathematical glory, to the successful adventurer, was the main purpose of these labors.

The *Theory of the Planets* presented the Problem of Three Bodies in a new form, and involved in peculiar difficulties; for the approxima-

² *Journal des Sçavans*, Aug. 1759.