

Excerpt from The Collected Mathematical Works of George William Hill, Vol. 3 Jupiter and Saturn must have presented to the earliest observers of the celestial motions less difficulties than the interior planets. The first things noted, undoubtedly, were, that the first made a circuit of the heavens in about twelve and the second in about thirty years. Then the retrograde motion, at the time of opposition, and its extent would be perceived. The slowness and steadiness of the motion would naturally suggest the hypothesis of circular motion, but it was certainly reserved for a later and more philosophic age to explain the later-observed phenomenon by means of an epicycle. The earliest tables of the motions of Jupiter and Saturn, as well as those of the other large planets which have come down to us, are those contained in the Syntaxis of Claudios Ptolemy. The annual parallax is there taken into account by one epicycle and the proper eccentricity of the orbit by a second. This, in the main, is the character of all the tables of the planets until the publication of Keplers Tabula Rudolphina in 1627, where, for the first time, the equation of the center is derived from an elliptic formula, and we pass from heliocentric to geocentric positions in the modern way. From Kepler onwards the fact of the deviation of Jupiter and Saturn from a purely elliptic theory was recognized. Many attempts were made to better the theory; but it was found that no observations, embracing a long period of time, could be satisfied by elliptic elements varying proportionally to the time. Halley seems to have been the most successful in his tables; he adopted terms in the mean longitudes varying as the square of the time. It was not until 1748 that any computation of the perturbations of Jupiter and Saturn, in accordance with the theory of gravitation, was undertaken. This was by Euler. He appears to have limited himself to the terms which have the mean elongation of the planets from each other as their argument. Later the terms factored by the simple power of the eccentricities were added by himself, Lalande, Bailly, and Lambert. But these terms not bringing about a reconciliation between observation and theory, Lagrange and Laplace were led to make their notable researches on the possibility of secular equations in the mean motions of the planets. At length the whole difficulty with Jupiter and Saturn was removed by Laplaces discovery of the great inequalities in 1786. Delambre almost immediately constructed tables for these planets which far exceeded in accuracy any previously possessed. They are those which appear in the third edition of Lalandes Astronomie. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at [www.forgottenbooks.com](http://www.forgottenbooks.com) This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works.

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