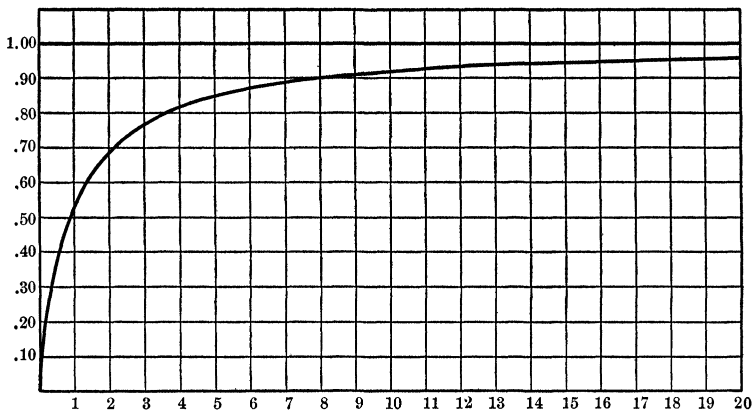
converges better the shorter the cylinder, so that by one of these formulas the calculation may always be made. Coffin has also given a formula by elliptic integrals, which is convenient when tables are at hand. Mr. Gordon Fulcher has



calculated by the three methods values for some twenty ratios, from which he has constructed the annexed graph of $L/4\pi^2a^3m^2z^2$, that is the factor of correction for the ends of the solenoid. When the length is ten times the diameter, five terms of (20) give nine figures of the result.

CLARK UNIVERSITY,
July, 1907.

ON THE APSIDAL ANGLE IN CENTRAL ORBITS.

BY DR. F. L. GRIFFIN.

(Read in part before the American Mathematical Society, April 27, 1907.)

THERE are two well known laws of central force all of whose trajectories have the same apsidal angle, whatever be the apsidal values of the radius vector, viz., that of Newton and the law that the force varies directly as the distance. For both of these laws the orbits are all conic sections, the apsidal angle being π in the former case, and $\frac{1}{2}\pi$ in the latter. Generally, however, the apsidal angle depends upon the apsidal values of the radius vector.

In this paper are considered only those laws of central force for which the force is a function of the distance, having a finite