PHYSICAL ASTRONOMY - On the mechanical and optical dissymmetry of space in connection with the absolute movement of the Earth.

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ASTRONOMIE PHYSIQUE. - Sur la dissymétrie méchanique et optique de l'espace en rapport avec le mouvement absolu de la Terre. Note de M. Ernest Esclangon, presentée par M. H. Deslandres.

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http://gallica.bnf.fr/ark:/12148/bpt6k31356/f921.table

Research of various kinds, whose idea and preparation began in 1925, were undertaken at the Observatory of Strasbourg with an aim of highlighting the absolute movement of the Earth by the apparent dissymmetry of space which can be the consequence for it.

Apart from the results of direct experiments currently in hand, I have the honor to have at the Academy the following results:

1) Mechanical Dissymmetries - a strong absolute movement of the Earth, apart from its orbital movement, can generate deflections of the plumb line, which, because of terrestrial rotation, would thus have a period like the sidereal day?

We have, with my collaborator M. Danjon, sought this oscillation by using data from the observations of the horizontal pendulum, in particular from continuous observations made at Potsdam from 1904 to1909.

The deflection of the plumb line can be looked at, a priori, as a quasi periodic function whose body of periods includes: the average solar day, the lunar day, solar years and lunar, etc, and finally, perhaps, the sidereal day.

Only, among these periods, the solar day and the sidereal day are very close. Let us suppose that one extracted from the composed function, the quasi-periodic part relative to these periods Tm and Ts, part which, if the corresponding phenomena comprised mutual reactions, would include moreover the derived periods T defined by:

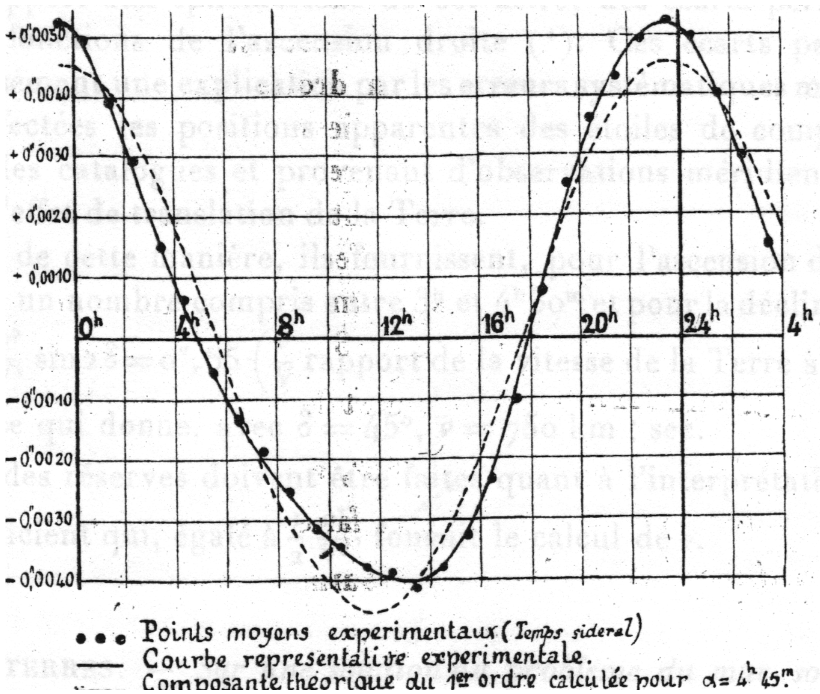
$$1/T = p/Tm + q/Ts \quad \text{(p,q, entireties)}$$

However the extraction, by way of averages, components corresponding to these various periods highlights an important sidereal component (of Ts period) represented by the figure opposite, for pendulum N^o 1. It is in amplitude higher than the 1/4 of that generated by the Sun, with half of that of the moon. Components corresponding to p=1, q=1, p=2,q=-1, p=3, q=-1, though perhaps weaker (from 1/4 to 1/9 of the sidereal component) are not however negligible.

If one interprets the deviations observed, as resulting from a terrestrial flatness whose variable poles would be directed towards a fixed point of the starry sky, one finds for the right ascension of this direction 4h35m (or 16h35m) with the N^o.1 pendulum; 3h30m with the pendulum N^o.2, directed has 90^o of the precedent (1). In truth, this last pendulum presented long gaps in the observations and tested important local disturbances.

(1) The method lends itself badly to the calculation of the variation.

However, a thorough examination seems to show that there is not, with respect to this mechanical effect, absolute symmetry compared to the meridian line of the place, as if the sidereal tide comprised a kind of special viscosity dephasing in a way different the successive components ordered in Fourier series compared to the time angle from the disconcerting celestial direction. This assumption, although singular, would agree with the existence of significant mutual reactions with respect to the solar component to which the period is very close.



... Mean experimental points (sidereal time)

___ Experimental representative curve

----- compensating for 1st order calculation for α = 4h 45 m

2.) Optical dissymmetries - direct and the meridian considered star observations reveal substantial differences between the angles of incidence and reflection. By using the direct and considered observations the circumpolar ones with their underpass (to have longer distances zenith) made with the Observatory of Strasbourg and by interpreting the divergence resulting from an effect similar to that preceding, we found, for the direction of movement, α = 4h 36m, $\delta = +44^o$ (or α = 16h36m, $\delta = -44^o$). M. Courvoisier, by the direct and considered observations made with Babelsberg and Leyde, obtained α = 6h, $\delta = +33^o$.

3.) The observations of star screenings by the moon highlight, compared to the ephemeredes of this star (i.e. the table of the stars expected position at a given time), of the unexplained periodic variations, functions of the right ascension (1). These variations appear to find an explanation precisely by the average systematic errors of the comparison of the apparent positions of stars provided by the catalogues are affected and coming uncorrected for the meridian observations effected by the translation of the Earth.

Interpreted in this manner, it provides, for right ascension of the absolute apex, a number ranging between 3h and 4h30m and for the declination δ, the relation $1/2 * v^2/V^2 \sin 2\delta = 0''.65$ (v/V = speed ratio of the Earth to that of the light); that gives, with $\delta = 45^o$, $v = 750$ km/sec.

However, reservation must be made for the physical interpretation of the coefficient which, equivalent to $1/2 * v^2/V^2$, provides the calculation of v.