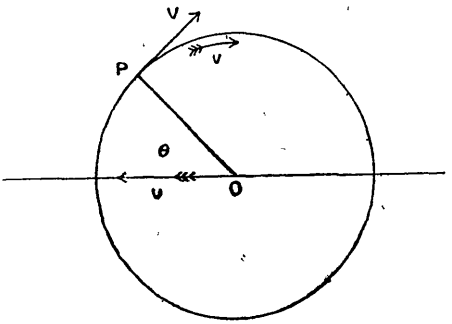
space is another flagrant instance of the reification of concepts." It would appear, however, that his strictures apply not to the arguments for the possibility of transcendental space, but to the arguments that we can have, under our present limitations, any practical acquaintance with such space.

ART. LI.—*The Equatorial Component of the Earth's Motion in Space.*

By DOUGLAS HECTOR.

[*Read before the Wellington Philosophical Society, 11th February, 1902.*]

ATTEMPTS have been made from time to time to find the velocity of the earth—or, rather, the solar system—in space by observing the proper motions of stars. Methods have also been suggested that depend on the relative motions of the earth and ether. The following method, however, I have not seen described anywhere, although it seems extremely simple. If a rotating body moves along a path in the plane of its equator, it is evident that a point on its surface moves faster relatively to space on one side of its path than on the other; but an acceleration is proportional to the rate of change of velocity, so that the point should undergo an alternating acceleration.



Let V = tangential velocity of the point P in space, u = velocity of earth's centre in space, and v = rotational velocity of P. Then, resolving along the tangent, we get $V = v - u \sin. \theta$. If f is the acceleration of P along the tangent,

$$f = \frac{dV}{dt} = -u\frac{d\theta}{dt} \cos. \theta = -u\omega \cos. \theta.$$

The motion of the sun, as deduced from the proper motion of the stars, is, according to Proctor ("The Sun"), 150,000,000 miles per year—that is, 25,154·38 ft. per second, the line of motion being inclined to the earth's orbit at about 53° in longitude 285°. This is about 60° to the earth's axis. Resolving along the equatorial plane, this gives—

$$u = 21{,}784 \text{ ft. per second;}$$

and, as $\omega = 0{\cdot}000073$ rad. per second,

$$\text{we get } f = -1{\cdot}584 = -\frac{g}{20} \text{ (about) when } \theta = 0.$$

Similarly, this would be the acceleration along the radius at $\theta = 90°$; so that the weight of a body at the equator should vary by 10 per cent. every twelve hours. The motion of the earth in space, therefore, cannot be as great as deduced from the proper motions of stars.

If A be the angle through which a plumb-bob is deflected by this spacial acceleration, we have—

$$\tan. A = \frac{-u\omega \cos. \theta}{u\omega \sin. \theta \cos. \lambda + g}.$$

Perhaps this in some part reconciles the seismological tides found by Milne with Lord Kelvin's value of the rigidity of the earth.

From an experimental point of view the method is very accommodating. Being a harmonic quantity, it does not matter when we set our instruments, which may, for the same reason, measure variations in pressures. Being an acceleration, it may be magnified to any extent by using large masses. With sufficiently delicate apparatus, and observations extending over a long period, it might be possible to deduce the relative motion and distance of a star for which the earth's orbit failed to show any parallax.

Art. LII.—*Mathematical Treatment of the Problem of Production, Rent, Interest, and Wages.*

By Douglas Hector.

[*Read before the Wellington Philosophical Society, 11th February, 1902.*]

The following attempt at a mathematical treatment of some of the problems of political economy was not originally intended for publication, but I have been persuaded to submit it as a paper to the Wellington Philosophical Society. I have not solved all the interesting points in the subject, but merely