

other of these two time-scales—the τ -scale, with its infinite past time, for mechanical phenomena, and the t -scale, with an origin some two billion years in the past, for electromagnetic phenomena.

In the next major portion of the book (Part II), Professor Milne develops a system of dynamics, based upon the two systems of kinematics to which he committed himself in Part I. Here again the procedure is marked by the imposition of further ad hoc assumptions, the effect of which is further to reduce the full complement of possibilities which would otherwise be available. Among these is the arbitrary definition $M = m \xi^{1/2}$ of the invariant inertial mass of a particle, where ξ is a rather complicated function of position and velocity, but which is in essence the inverse of the Fitzgerald-Lorentz contraction factor met in the special theory of relativity. But the most serious limitation is that imposed upon the motion of a test particle by the requirement that a certain acceleration function G , which can in general depend on both t and ξ , is to have the fixed value $G = -1$. The justification for this restriction, which is put forward in conjunction with the study of statistical systems of particles in Part III, depends in part upon a dimensional argument which is compelling, even in the restricted kinematics to which Milne has committed himself, only if one is prepared to believe that the theory under construction is so universal that it will account for all dimensionless physical constants encountered in subsequent contact with the empirical. A novel theory of light-quanta, based upon this dynamics, leads Milne to the conclusion that Hubble and Tolman have over-corrected for the reduction in luminosity of a nebula caused by its motion, and are in consequence led to an excessive curvature in Hubble's general relativistic model of the expanding universe. Milne's result follows from the fact that in his t -kinematics, Planck's constant varies directly with the epoch—as does also the gravitational constant introduced later.

Part III examines the nature and distribution of a statistical system of particles, and leads, after the specialization mentioned above, to identifying gravitation with the tendency for test particles to be accelerated toward the particles of the substratum. The final Part IV consists in a partial extension of the a priori formalism to electrodynamics, in exploration of the possibilities which the new dynamics may there unfold. But by this point the self-imposed restrictions and ad hoc assumptions make it difficult to consider these developments, including a bizarre theory of the structure of spiral nebulae, as a fulfillment of the ambitious program upon which Professor Milne embarked at the outset.

In conclusion, the reviewer would like to say that the program to which Professor Milne has here applied himself—that of building up an abstract mathematical system of kinematics and dynamics and even electrodynamics—is an intriguing one, the exploration of which should lead the enquiring mind through vistas of possible uniform background worlds, against an appropriate one of which the real world with its variety would stand out in concrete relief. But he fears that the present attempt suffers from undue restrictions, both tacit and explicit, which

impair its validity as the basis for a universal model, and that its methodological short-comings are too serious to be offset by isolated points of apparent agreement with the empirical.

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ZAMP

JOURNAL OF APPLIED MATHEMATICS AND PHYSICS (ZEITSCHRIFT FÜR ANGEWANDTE MATHEMATIK UND PHYSIK). Vol. I, No. 1, January 15, 1950. Edited by R. Sängner. Verlage Birkhäuser, Basel, Switzerland.

This is a new journal in the field of applied physics. Its aim, according to the publisher, is "to bridge the gap existing between the periodicals devoted to pure mathematics and physics on the one hand, and those confined to the construction engineering science, on the other hand."

It will contain survey articles, original papers, "Brief Reports," book reviews, and general information. The Brief Reports will be published six weeks after receipt of them by the editor, provided the author forgoes the proof reading. The languages can be German, English, or French. The original articles have a summary in a different language from the article itself.

The first number contains the first half of a very good survey article on semiconductors. The three original articles deal with wind tunnel experiments on airplane wings, circuit theory, and numerical solution of boundary value problems. There is only one Brief Report dealing with selection rules in x-ray diffraction.

In this first issue all articles are in German. Of the three original articles, one has its summary in English, the other two in French. The usefulness of the journal might be improved if the Brief Reports could also have one paragraph in another language as it is expected that these may often contain early information on important new work. Since the Swiss users of the journal are almost equally familiar with both French and German, it would seem somewhat more logical to use English for the majority of the summaries.

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Flying Blind

DEFORMATION AND FLOW. An Elementary Introduction to Theoretical Rheology. By Markus Reiner. 346 pp. Interscience Publishers, Inc., New York, 1949. \$6.50.

A crystal or liquid can be thought of as a giant molecule. Such a giant molecule is made out of atoms which are joined by chemical and physical forces into a more or less tightly interconnected whole. The fiction that such a system is a continuum has been useful in classical hydrodynamics, in elastic theory, and in Debye's hands as a basis for a statistical theory of specific heats.

The continuum fiction, however, is at best a crutch. To solve Lagrange's equations for the normal vibrations has been shown to be extremely difficult by Blackman and others. Flow in general occurs where there are flaws providing empty space for the atoms to jump into. Thus for flow we need to know not only the regular structure of our giant molecule but the flaws in the structure. Such