

# *Uniformly Moving Dislocations in Anisotropic Media*

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In Memoriam P. F. NEMÉNYI

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**1. Introductory remarks.** Dynamic dislocations have been the subject of a number of recent investigations<sup>1, 2, 3</sup> because of their importance in solid state physics. The main objective of this paper is to systematize and extend these results by constructing a class of uniformly moving dislocations in anisotropic media of arbitrary type and by studying their broad qualitative properties. These discontinuous elastic fields are a generalization of the static dislocations first discussed by Volterra<sup>4</sup> in a celebrated memoir, and later elaborated by Burgers<sup>5</sup> in connection with certain problems of strength of solids. We shall call them *uniformly moving Volterra dislocations*.

The first four sections of this study are preliminary in character.

In the present section we summarize our principal results.

In Section 2 we discuss the properties of a class of displacement fields which we call *essentially static*, characterized by the property of being static in a certain Galilean frame moving with velocity  $\mathbf{v}$  with respect to coordinates fixed in the medium. After deriving their equations of motion in terms of the appropriate Galilean axes, we answer the following question: for what values of  $\mathbf{v}$  are these equations of elliptic type? The ellipticity property holds if and only if  $\mathbf{v}$

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<sup>1</sup> F. C. FRANK, *Proc. Phys. Soc.*, **62**, 202 (1949).

<sup>2</sup> J. D. ESHELBY, *Proc. Phys. Soc.*, **62**, 307 (1949).

<sup>3</sup> F. R. N. NABARRO, *Phil. Mag.* (7), **42**, 1224 (1952).

<sup>4</sup> V. VOLTERRA, *Ann. de l'Éc. Norm. Sup.*(3), **24**, 401 (1907).

<sup>5</sup> J. M. BURGERS, *Verhand. Kon. Akad. v. Wet. te Amsterdam*, **42**, 293, 378 (1949).