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ABSTRACTS OF PAPERS PRESENTED AT THE SYMPOSIUM BUT NOT PUBLISHED IN FULL IN THIS VOLUME

FIRST-ORDER STRESSES AND DEFORMATIONS IN GLACIERS AND ICE SHEETS

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ABSTRACT. It appears that the well-known theory describing flow of glaciers and ice sheets over undulations is defective with regard to the precise form of the field equations and boundary conditions to be applied. In particular, when surface-wave phenomena are to be described the formulation of Budd does not seem to be applicable.

The governing field equations and boundary conditions are, therefore re-derived, aiming, first, at a clear and systematic formulation of the basic equations, separating, secondly, the steady-state and transient response and, thirdly, attempting to use (regular and singular) perturbation techniques in answering various questions of the state of stress and velocity in a nearly parallel-sided slab. Results are different from previous ones. In fact Budd's analysis of the transfer of the bedrock topography to the surface is paralleled with the striking result that filter functions do not indicate the existence of a preferred-wavelength transfer, but the results show a marked dependency on the steepness of the ice slope. As far as surface waves are concerned, the results of the kinematic wave theory are corroborated for surface elevations that are small compared with the thickness of the ice sheet and for very long waves. When these conditions are not satisfied surface-wave equations become non-linear and exhibit features similar to the Burgers equation. In all these equations diffusion is more significant for ice sheets than for glaciers (with larger mean inclinations).

ICE-SHELF UNDERWATER MORPHOLOGY

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ABSTRACT. A side-scan sonar survey was conducted near the ice front of Riiser-Larsenisen during the 1976–77 Norwegian Antarctic Research Expedition to investigate the underwater ice-shelf morphology. The survey covered several shorter, widely-spaced sections, for a total of about 10 km along the ice front. Only a smaller part of the sections showed a smooth, straight ice front. Most of the observed ice fronts were very rough at the scale of decametres. Projections at around 100 m water depth commonly extended 50–200 m seaward of the above-water ice shelf, and had widths of similar dimensions.