his technique. Its presentation, which is informal and incorporates many beautiful pictures, gives one the feeling "this isn't going to hurt". Unfortunately, many readers will suffer agony before reading the last chapter. Much of this is because of the sheer difficulty of the subject —each problem has to be tackled with bare hands and technical details have to be glossed over, with consequent loss of clarity. There does seem to be, however, a general lack of motivation; for example, in the chapter on network theory, the reader is led through pages of difficult calculations involving the boundary operator, without being previously told what they are for. There are seven chapters; in the first two, compact surfaces are classified by triangulation and in the third there are applications to Riemann surfaces. Winding number, the degree of a map, the Brower fixed-point theorem and the Borsuk-Ulam theorem for surfaces, with applications to complex analysis, occupy chapter four. The fifth treats vector fields and their singularities. The sixth and seventh, respectively, cover network theory and some topology of 3-manifolds. There are about three pages of exercises at the end of each chapter. The book would certainly be of value to anyone teaching topology at this level. C. B. RAYNER

TEXT FOR GEODESISTS

Physical Geodesy

By Weikko A. Heiskanen and Helmut Moritz. (A Series of Books in Geology, edited by Gilluly and Woodford.) Pp. vi + 364. (San Francisco and London: W. H. Freeman and Company, 1967.) 110*s*.

NINE years ago one of the authors of this book, Professor Heiskanen, and the late Professor Vening Meinesz wrote *The Earth and its Gravity Field* which was widely acclaimed. Until then the application of measurements of the intensity of gravity to the study of geodesy, and the determination of the Figure of the Earth, was largely based on the well known theorem of Stokes, first published in 1849. The great disadvantage of this approach is that gravity anomalies have to be reduced to a co-geoid which is a bounding equipotential surface before the theorem can be used, necessitating assumptions as to the density of the Earth's topography which has to be computationally removed. In 1945 Molodensky proposed a new approach which used ground level gravity anomalies without further reduction; in the last ten years or so many scientists have followed and further developed such methods. Consequently Heiskanen and Moritz have written a book which is completely new, rather than a revision of *The Earth and its Gravity Field*. The major difference between the new book and the old is that the new one describes this modern theory and, as a consequence, there is no space for any of the chapters on the geophysical aspects of gravity which formed a large part of the old book.

The first five chapters cover the material for a basic course in physical geodesy. The first chapter is entitled "Fundamentals of Potential Theory". It is complete and well explained although many long derivations of formulae are omitted and the reader is referred to standard textbooks. The second chapter is entitled "The Gravity Field of the Earth"; this again is well presented and includes full discussions of the generalized Stokes formula and the determination of the physical constants of the Earth. The third chapter, "Gravimetric Methods", describes the various conventional forms of reduction and the practical determination of the geoid, including the theory and use of isostasy.

The fourth and fifth chapters, "Heights above Sea Level" and "Astro-geodetic Methods", formulate the reductions necessary to height and astronomical measurements to bring them to the geoid or ellipsoid. Although there are paragraphs on accuracy and the effect of gravity and density errors on height, there appears to be nowhere in the fourth chapter a reasoned statement as to when normal or theoretical gravity may be used instead of measured gravity without significant loss of accuracy. The authors, however, state in their preface that the book "is intended to be theoretical in the sense in which the word is used in the term 'theoretical physics' ", so they are being consistent. A corollary of this is that there is no chapter on instruments or the measurement of gravity.

The remaining four chapters present more specialized and advanced topics. The sixth chapter gives formulae for the "Gravity Field outside the Earth". The seventh chapter gives a short discussion on "Statistical Methods in Physical Geodesy" which are in wide use today, while the eighth chapter is entitled "Modern Methods for Determining the Figure of the Earth". If criticism has to be made, it is that these last two chapters are too short; for instance de Graaf-Hunter's "Model Earth" is merely referred to in one line. The ninth chapter devotes twenty-six pages to "Celestial Methods", including the use of the Moon as well as artificial Earth satellites; it thus necessarily gives but an outline of the subject matter.

Attention must be drawn to one important feature: the concept of the geoid is fully maintained, not rejected as obsolete, and geometrical interpretations are given of all modern methods, adding much to their understanding and appreciation. The authors thus show that the supposed dichotomy between the new thinking and the old is not nearly as great as some would imply, and a full reconciliation of the two approaches is made.

As is inevitably the case today, the most up to date information on all the topics discussed in the book can only be found in many and widely different journals or university publications, not all of which are readily available to the average geodesist. Almost every geodetic measurement depends in a fundamental way on the Earth's gravity field, and so the authors have performed a signal service to geodesy in collating such information in one volume, and presenting it in a logical form and sequence which is readily understandable. They are to be congratulated not only on producing a much-needed book which every geodesist should buy, but also on writing in such impeccable English, which is the native tongue of neither.

It remains to add that each chapter has a full list of references at the end, and that there is a detailed list of contents and a good index. The book is well produced and the numerous diagrams are very clear; this and the apparent lack of misprints show a happy co-operation between the authors and the publisher. A. R. ROBBINS

POLYMERS RE-ISSUED

High-Temperature Polymers

Edited by Charles L. Segal. Pp. viii + 197. (London: Edward Arnold (Publishers), Ltd.; New York: Marcel Dekker, Inc., 1967.) 70*s*. net.

IN 1966 Marcel Dekker, Inc., launched the *Journal of Macromolecular Chemistry*. By the time the second or third issues of the first volume appeared plans must have been advanced to replace this journal in 1967 by the *Journal of Macromolecular Science* published in four sections. In Britain the total subscription to this journal is $154 and many libraries may await an assessment of its quality before ordering, for this is more than four times the price of the pilot journal of 1966. Part *A* of the *Journal of Macromolecular Science*, devoted to chemistry, is the direct successor of the 1966 journal. The first two issues consist of papers presented at symposia, one on high temperature polymers and one on polyaldehydes. Subsequent issues of Part *A*, Volume 1, contain contributed research papers.