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Partial differential relations, by Mikhael Gromov. Ergebnisse der Mathematik und ihrer Grenzgebiete, Vol. 9, Springer-Verlag, Berlin, Heidelberg, New York, London, Paris and Tokyo, 1986, ix + 363 pp., $60.00. ISBN 0-387-12177-3

In this important book, Gromov studies very general classes of partial differential equations and inequalities, many of which arise from problems in differential geometry. Using a variety of surprising and intricate techniques, he shows that in many cases these partial differential relations satisfy the "h-principle", i.e., they admit rich families of solutions whenever the appropriate topological obstructions vanish.

Most of the ideas presented here have their origins in a series of papers which Gromov wrote in Russian in the later 60s and early 70s, some alone and some in collaboration with Eliashberg and Rochlin. Thanks to the excellent lecture notes of Haefliger [**H**] and Poenaru [**P**], the earliest part of this work is reasonably well-known. However, this is just the tip of the iceberg: the later papers contain many more, totally original ideas. Unfortunately, these papers were sketchily written, and contained various references to other papers which never appeared. Gromov has devoted a great deal of effort over the past few years to working out these ideas. The end result is this magnificent book.

The core of the book is a series of abstract and powerful theorems. These include a sharp version of the Nash-Moser implicit function theorem which is specific to partial differential operators, as well as much more geometric results such as the main flexibility theorem and the theorems about convex