

MR1912135 (2003i:05058) 05C15 (05C65)

Voloshin, Vitaly I.

★ **Coloring mixed hypergraphs: theory, algorithms and applications. (English summary)**

Fields Institute Monographs, 17.

American Mathematical Society, Providence, RI, 2002. xiv+181 pp. \$49.00. ISBN 0-8218-2812-6

This is a very interesting and magnificent book on colourings. It belongs on the shelves of everyone who works not only in graph and hypergraph theory, but more generally in discrete mathematics. The new idea of the author, to study a type of colourings different from the classic definition and all its generalizations, is described.

The main feature is that mixed hypergraphs represent structures in which problems on both the minimum and maximum number of colours occur. The author develops the theory with all the results obtained to date. This book will be a useful reference text for people who study hypergraphs as well as related fields and applications. The level of the text is aimed at graduate and research use.

In the introduction, the author gives an overview of graph colouring, introduces the idea of mixed hypergraph colouring, and describes unforeseen features and philosophical motivation. In the first chapter he surveys results related to the lower chromatic number. Subsequent chapters are devoted to uncolourable (having no colourings), uniquely colourable (having a unique feasible partition), C -perfect (having perfection with respect to the upper chromatic number), interval (generalizations of interval hypergraphs), pseudo-chordal (generalizations of chordal graphs) and circular (generalizations of cycle) mixed hypergraphs. Of special interest and fundamental importance are the chapters describing the gaps in the chromatic spectrum (they are not possible in classic colourings), planar mixed hypergraphs (generalizations of planar graphs) and colourings of block designs (Steiner triple and quadruple systems), considered as mixed hypergraphs. The last chapter contains 10 models of application of the concept of mixed hypergraph (ranging from computer science to molecular biology). Each chapter ends with a list of open problems, and the book contains many algorithms.

It is worth mentioning that the author maintains the mixed hypergraph colouring web site at <http://math.net.md/voloshin/mh.html>, which in addition to detailed material about the monograph contains a list of all publications on this new scientific direction.

Reviewed by *Mario Gionfriddo*

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