



BOOK REVIEW

Lie Groups: A Problem-Oriented Introduction via Matrix Groups, by Harriet Pollatsek, The Mathematical Association of America, USA, 2009, ix + 177 pp., ISBN 978-0-88385-759-5.

The author of the book Harriet Pollatsek is a mathematics professor at Mount Holyoke college who has played an important role for young women in the last three decades. She enjoys helping her students to love mathematics and is known to “particularly relish the challenge of changing the opinion of someone who is sure she doesn’t like mathematics.” In 2007 she was awarded the Faculty prize as “that rarest of teachers who excels in virtually every pedagogy invented: lecturing, small groups, laboratory guidance, mentoring.”

The book is distinctive by the low prerequisites (multi-variable calculus and linear algebra) and the development of about 200 problems. It can be used as a supplementary text in linear algebra or as an active reading that helps students make the transition to upper level courses based on differential geometry and topology.

The theory of the Norwegian mathematician Sophus Lie explores the beauty of ideas of symmetry which leads to various applications in mathematics and physics. Conventionally, the study and understanding of Lie theory (Lie groups and Lie algebras) requires deep mathematical knowledge in differential geometry.

This book starts with matrix groups [1]. It aims at making the basics of Lie theory accessible [2] to students who have taken multivariable calculus and linear algebra. It is concentrated on algebraic ideas with enough analysis to define the tangent space and the differential in order to make sense of the exponential map. Topology is excluded except for reference to connected and simply connected sets and closed sets. Quotient structures are also excluded. Groups of Lie type over finite fields are also briefly discussed.

This book aims at teaching matrix groups through very little lecturing but with a lot of working on problems by presenting and discussing their solutions. Throughout the book the point of view of symmetry principles is emphasized and the way mathematics provides a language to understand the world of physics. Since