BOOK REVIEW

Problems and Solutions for Groups, Lie Groups, Lie Algebras with Applications, by Willi-Hans Steeb, Igor Tanski and Yorick Hardy, World Scientific, Singapore 2012, x + 342 pp, ISBN 978-981-4383-90-5.

The authors come from the Johannesburg University, South Africa. One of them, Professor Willi-Hans Steeb is a managing director of the International School for Scientific Computing at the same University.

The purpose of the book, as announced in the Preface, is to supply a collection of problems in group theory, Lie group theory and Lie algebras. Each Chapter contains 100 completely solved problems.

Chapter 1 starts with the definitions of a group G. It also introduces the main notions such as subgroup, left and right cosets, the center $Z(G)$ of a group, as well as the centralizer of any subset $X \in G$.

After that the authors start to formulate problems, each one solved immediately. First they treat different types of group multiplications, some of which are rather unusual. Next, solving Problem 6 one finds that the complex numbers $q + \mathrm{i}p\sqrt{5}$, where p and q are real rational numbers, form a group under multiplication of complex numbers. Similarly solving the next Problem 7 one realizes that the real numbers $r + s\sqrt{p}$, where r and s are rational numbers and p is a prime number, also form a group under the multiplication of real numbers.

The problems gradually become more and more involved which allows a beginner in the field to master the technicalities and to get a good knowledge in the field. Several of the problems concern the finite groups: the dihedral groups D_3, D_4, the cyclic groups C_3, C_4, the Kleinian group of order four. Thus one encounters their multiplication tables, characters and equivalence classes. The Chapter ends with two programming problems on Maxima with solutions and eight supplementary problems which are left to the reader.

The second Chapter is devoted to the Lie groups. It allows a diligent student to master and understand on simple examples a number of important facts about the Lie groups. The authors treat all important classical series of Lie groups $\mathrm{GL}(n, \mathbb{C})$,