

## Preface to the Russian Edition

This book is an extended version of a course given by me at Novosibirsk University from 1996 to 2001. The purpose of the book is to present the fundamentals of group theory and to describe some nontrivial constructions and techniques, which will be useful to specialists. The fundamentals are given in Sections 1–9 of Chapter 1; also one can read Chapters 1 and 2 independently.

In Chapter 1 we quickly introduce beginners to the classification of finite simple groups. It is shown that such complicated combinatorial objects as the Mathieu group  $M_{22}$  and the Higman–Sims group  $HS$  have a natural geometric description. In Section 17 we describe the relationship between Mathieu groups and Steiner systems with coding theory.

In Chapter 2 we describe the Bass–Serre theory of groups acting on trees. This theory gives a clear and natural explanation of many results about free groups and free constructions. We also explain the theory of coverings: the attentive reader will see a bridge from one theory to the other. I hope that numerous examples, exercises and figures will help to give a deeper understanding of the subject.

The reader is assumed to have the knowledge of algebra expected after the first semester of university (permutations, fields, matrices, vector spaces; see [39]). In addition, the fundamentals of group theory (especially abelian, nilpotent and solvable groups) can be read in the excellent book of M. I. Kargapolov and Ju. I. Merzljakov [38].

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A tree in the neighborhood of Sprockhövel (Germany)