

Developments in Mathematics

Andrej Dujella

Diophantine *m*-tuples and Elliptic Curves

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A. Dujella

Diophantine m-tuples and Elliptic Curves

- A unique mixture of classical mathematics and recent research
- · Present solutions of problems that were open for centuries
- Provides an attractive introduction to elliptic curves for students

This book provides an overview of the main results and problems concerning Diophantine m -tuples, i.e., sets of integers or rationals with the property that the product of any two of them is one less than a square, and their connections with elliptic curves. It presents the contributions of famous mathematicians of the past, like Diophantus, Fermat and Euler, as well as some recent results of the author and his collaborators. The book presents fragments of the history of Diophantine m -tuples, emphasising the connections between Diophantine m -tuples and elliptic curves. It is shown how elliptic curves are used in solving some longstanding problems on Diophantine m -tuples, such as the existence of infinite families of rational Diophantine sextuples. On the other hand, rational Diophantine m -tuples are used to construct elliptic curves with interesting Mordell–Weil groups, including curves of record rank with agiven torsion group. The book contains concrete algorithms and advice on how to use the software package PARI/GP for solving computational problems. This book is primarily intended for researchers and graduate students in Diophantine equations and elliptic curves. However, it can be of interest to other mathematicians interested in number theory and arithmetic geometry. The prerequisites are on the level of a standard first course in elementary number theory. Background in elliptic curves, Diophantine equations and Diophantine approximations is provided.

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