

Mathematics Colloquium

Decompositions and statistics for $\beta(1, 0)$ -trees and nonseparable permutations

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11:10 a.m. – 12:00 p.m.
Building 53 Room 201

Abstract

The subject of pattern avoiding permutations has its roots in computer science, namely in the problem of sorting a permutation through a stack. A formula for the number of permutations of length n that can be sorted by passing it twice through a stack (where the letters on the stack have to be in increasing order) was conjectured by West, and later proved by Zeilberger. Goulden and West found a bijection from such permutations to nonseparable planar maps, and later, Jacquard and Schaeffer presented a bijection from these planar maps to certain labeled plane trees, called $\beta(1, 0)$ -trees. Using generating trees, Dulucq, Gire and West showed that nonseparable planar maps are equinumerous with permutations avoiding the (classical) pattern 2413 and the barred pattern $41\bar{3}52$; they called these permutations *nonseparable*. We give a new bijection between $\beta(1, 0)$ -trees and permutations avoiding the dashed patterns 3-1-4-2 and 2-4-1-3. These permutations can be seen to be exactly the reverse of nonseparable permutations. Our bijection is built using decompositions of the permutations and the trees, and it translates seven statistics on the trees into statistics on the permutations. In connection with this we give a nontrivial involution on the $\beta(1, 0)$ -tree, which specializes to an involution on unlabeled rooted plane trees, where it yields interesting results.

This is joint work with Anders Claesson and Einar Steingrímsson.

About the speaker: Sergey Kitaev is an Associate Professor in the Mathematics Institute at Reykjavik University. He received his PhD from Göteborg University in 2003 and has held visiting positions at the University of California at San Diego, at the University of St Andrews in Scotland, and the Mittag-Leffler Institute. His research interests include combinatorics, discrete analysis, graph theory, and formal languages.

Refreshments before the talk, 10:30 - 11 a.m.,
in the Math Department Conference Room, 25-208B.