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Federico Ardila* (federico@sfsu.edu). *The combinatorics of CAT(0) cubical complexes and robotic motion planning.*

We say that a cubical complex X is “CAT(0)” if it has non-positive curvature. CAT(0) cubical complexes play an important role in pure mathematics (group theory) and in applications (phylogenetics, robot motion planning, etc.) In particular, when one studies the possible positions of a discrete robot, one often finds that they naturally form a CAT(0) cube complex.

Gromov gave a remarkable topological/combinatorial characterization of CAT(0) cube complexes. We give an alternative, purely combinatorial description of them. Using this description, we give an algorithm to construct the shortest path between two points. For many robots, we can use these tools to find the fastest way to move from one position to another one.

The talk will describe joint work with Tia Baker, Megan Owen, Seth Sullivant, and Rika Yatchak. (Received September 21, 2012)