



On the Piano Movers Problem: II. General Techniques for Computing Topological Properties of Ral Algebraic Manifolds (Classic Reprint)

By Jacob T Schwartz

Forgotten Books, United States, 2015. Paperback. Book Condition: New. 229 x 152 mm. Language: English . Brand New Book ***** Print on Demand *****. Excerpt from On the Piano Movers Problem: II. General Techniques for Computing Topological Properties of Ral Algebraic Manifolds Abstract: This paper continues the discussion, begun in [SS], of the following problem, which arises in robotics: Given a collection of bodies B, which may be hinged, i.e. may allow internal motion around various joints, and given a region bounded by a collection of polyhedral or other simple walls, decide whether or not there exists a continuous motion connecting two given positions and orientations of the whole collection of bodies. We show that this problem can be handled by appropriate refinements of methods introduced by Tarski and Collins, which lead to algorithms for this problem which are polynomial in the geometric complexity of the problem for each fixed number of degrees of freedom (but exponential in the number of degrees of freedom.) Our method, which is also related to a technique outlined by Reif, also gives a general (but not polynomial-time) procedure for calculating all of the homology groups of an arbitrary real algebraic variety. Various algorithmic issues concerning...



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