1077-55-1404 **Tomasz Kaczynski*** (t.kaczynski@usherbrooke.ca), Département de mathématiques, Université de Sherbrooke, 2500 boul. Université, Sherbrooke, Quebec J1K 2R1, Canada, and **Marian Mrozek**. *Cohomology Ring: Algorithmic approach.*

In the past two decades, the homology and cohomology theories gained a vivid attention outside of the mathematics community prompted by its modern applications in sciences and engineering, in particular, in dynamics, material science, digital imaging, and electromagnetism. Until recently, the main progress has been done in computation of homology groups of finitely representable objects. Whenever a mathematical model was making it possible as, for example, in the case of orientable manifolds, the duality has been used to avoid explicitly working with cohomology. The cup product endows the cohomology with the ring structure which permits distinguishing between nonhomotopical spaces which homology groups do not distinguish. However, this intrinsically more difficult theory had to wait longer for computer implementations. Some of application-oriented work on computing the cohomology ring of simplicial complexes is done by Gonzalez-Diaz and Real. We developed a cohomology ring algorithm in a dimension-independent framework of combinatorial cubical complexes. This approach is convenient in the cup-product computation and motivated, among others, by interpreting pixels or voxels as cubes. The S-complex theory and so called co-reductions are adopted to speed up the computations. (Received September 19, 2011)