

1077-55-2362

Pawel Dlotko* (pawel.dlotko@uj.edu.pl), Łojasiewicza 6, 30-348 Kraków, Poland.

Applications of computational homology and cohomology theory. Preliminary report.

Depending on the time available, I will present a few selected applications of computational (co)homology theory, I am currently working on: 1) Computational topology and Maxwell's equation" An efficient numerical method to solve Maxwell's equation called DGA needs a kind of topological information which are the representatives of the first cohomology group generators. Idea of the method and fast algorithms to compute cohomology group and ring will be presented. 2) Analyzing nodal domains of trigonometric polynomials" Topology-preserving method based on interval arithmetic returns a non-regular cubical grid the homology of which need to be computed in some applications. In this part of talk I will present an algorithmic way of computing homology for a wide class of CW-complexes called regular CW-complexes and present how the homology can be used in material science. 3) Recently more attention is focused at distributed computations. In this part of my talk I will cover the topic of topology in sensor networks used to solve the coverage problem. (Received September 22, 2011)