1096-VG-374 **Pawel Dlotko*** (dlotko@sas.upenn.edu), Department of Mathematics, University of Pennsylvania, Philadelphia, PA. *Algebraic topology in computational electromagnetism.*

For many decades Maxwell's equations in the form of PDE's have been used to describe electromagnetic phenomena in electric circuits. In the '80 a so called Discrete Geometric Approach (DGA) to Maxwell's laws has been introduced. The DGA builds a discrete counterparts of Maxwell's laws in a given mesh which consist of conducting and insulating sub-meshes. However, when the topology of conductors is nontrivial, so called cuts are needed to make the discrete laws well defined. For many years the engineering community has struggle to provide a good definition and algorithm to compute cuts. In this talk we will give an idea of DGA and define the cuts as a representatives of a first cohomology group basis of insulator. We will show that this is a correct definition of cuts, in a sense that only such a cohomological information makes the DGA consistent. We will also provide an efficient algorithms to compute cohomology generators. At the end we will present results of our computations for a industrial size meshes. (Received August 30, 2013)