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Electromagnetic modeling provides an interesting context to present a link between physical phenomena and homology and cohomology theories. When magneto-quasi-static discrete formulations based on magnetic scalar potential are employed in problems which involve conductive regions with holes, cuts are needed to make the boundary value problem well defined. While an intimate connection with homology theory has been quickly recognized, heuristic definitions of cuts are surprisingly still dominant in the literature. My talk will consist mainly of three parts: In the first one a survey of the heuristic methods present in the literature will be provided. For each of them a suitable example will be given which points out that the considered methods are not valid. In the second one a formal proof will be given showing, that the cuts for edge- element methods are first cohomology group generators. In the third part an efficient algorithmic techniques to compute cohomology group generators on various meshes (including nonstandard ones) will be presented. Finally, the numerical simulation for large-scale industrial meshes will be presented. If the time permits I will also present some semi-algorithms for a fast computations of cohomology generators. (Received September 22, 2011)