1064-78-9 **Sergey V Petropavlovsky** and **Semyon V Tsynkov*** (tsynkov@math.ncsu.edu), Department of Mathematics, North Carolina State University, Box 8205, Raleigh, NC 27695-8205. *A Non-Deteriorating Algorithm for Computational Electromagnetism Based on Quasi-Lacunae of Maxwell's Equations.*

The performance of many well-known methods used in computational electromagnetism for the treatment of outer boundaries may deteriorate over long time intervals. The methods found susceptible to this undesirable phenomenon include some local low order artificial boundary conditions , as well as perfectly matched layers. We propose a universal algorithm for correcting this problem. It works regardless of either why the deterioration occurs in each particular instance, or how it actually manifests itself (loss of accuracy, loss of stability, etc.). Our algorithm relies on the Huygens' principle in a generalized form, when a non-zero electrostatic solution can be present behind aft fronts of the propagating waves, i.e., inside the lacunae of Maxwell's equations. In this case, we refer to quasi-lacunae as opposed to conventional lacunae, when the solution behind aft fronts is zero. The use of quasi-lacunae allows us to overcome a key constraint of the previously developed version of the algorithm that was based on genuine lacunae. Namely, the currents that drive the solution no longer have to be solenoidal. Another important development is that we apply the methodology to general non-Huygens' problems. (Received July 09, 2010)