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## **An effective approach on finite-difference-time-domain method for quasi-static electromagnetic field analysis**

**Minhyuk Kim<sup>a</sup>, Hyun-Kyo Jung<sup>a</sup> and SangWook Park<sup>b</sup>**

<sup>a</sup>Department of Electrical and Computer Engineering, Seoul National University,  
Seoul, Korea

<sup>b</sup>ICT Convergence Research Team, EMI/EMC R&D Center, Corporation Support  
& Reliability Division, Korea Automotive Technology Institute,  
Chon-Ahn, Korea

`ejnp@snu.ac.kr, hkjung@snu.ac.kr, parksw@katech.re.kr`

### **Abstract**

This paper deals with an effective computational electromagnetic numerical method for the quasi-static field problems. There are lots of numerical technique to simulate electromagnetic problems. Among them, the finite-difference-time-domain (FDTD) is a popular method to analyze huge computational complexity problems. However, it is realistically impossible to apply directly standard FDTD method to the near-field analysis under a few MHz because of the time step problem. We overcome this by approximating the current source to have quasi-static behavior on the arbitrary surface at first. Then, the surfaces are employed in the FDTD method as the source excitation by the surface equivalence theorem. The time consuming computation problems are treated efficiently and the results of our method are in good agreement with full-wave analysis electromagnetic commercial solver.

*Key words:* Finite-difference-time-domain, quasi-static electromagnetic field, surface equivalence theorem.