

Abstract Submitted
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Analytical methods for design of surface-electrode ion traps J.H. WESENBERG, J.M. AMINI, R.B. BLAKESTAD, J. BRITTON, K.R. BROWN, R.J. EPSTEIN, J.P. HOME, W.M. ITANO, J.D. JOST, C. LANGER¹, D. LEIBFRIED, R. OZERI², S. SEIDELIN, D.J. WINELAND, Time and Frequency Division, NIST, Boulder, Colorado 80305, USA — Surface-electrode ion traps^{3,4} are promising candidates for the large scale multi-zone ion traps which are required for large scale quantum information processing. Electrode design for surface-electrode traps is complicated by the low symmetry and the large exposed electrode area. We apply a simple method⁵ to obtain analytical expressions for the field of arbitrarily shaped surface-electrodes. The efficiency of this method compared to traditional boundary (BEM) or finite (FEM) element methods has allowed us to use numerical optimization techniques to help in the design of advanced trap structures, such as intersections and ion separation zones. Work supported by DTO and NIST. J.H.W. acknowledges support from the Danish Research Agency.

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