

Virtual resistive network and a development of an anisotropic conductivity reconstruction method *

Yong-Jung Kim (with Min-Gi Lee)

Department of Mathematical Sciences, KAIST, 335 Gwahangno, Yuseong-gu, Daejeon, 305-701, Republic of Korea

Fax: +82-42-350-5710
email: yongkim@kaist.edu

June 30, 2009

Abstract. In this talk we consider a non-iterative conductivity imaging method using internal electrical currents and a boundary conductivity. An electrically conducting body is approximated using a rectangular resistive network. In this way the conductivity image is recovered by a direct method based on the local structure of the current given by the Kirchhoff's law of voltage. This method gives a fast conductivity reconstruction algorithm for an isotropic conductivity. Even if the conductivity tensor is given as a diagonal matrix, which we call a semi-anisotropic case, the method shows a good performance for both of 2 and 3 dimensional bodies. Its stability tests of the method is somewhat reasonable. However, the method does not fit to a fully anisotropic case. In fact, it is known that the 5 stencil finite difference scheme does not fit to an anisotropic case and the rectangular resistive network actually provides an equivalent forward solver. It seems that there is no resistive network that fits to the anisotropic case. The virtual resistive network (VRN) has been recently designed to recover an anisotropic conductivity keeping the nice property of the network method that uses the local structure of the internal current. In this talk we will briefly introduce its concept and a progress.

* This work was supported by the Korea Science and Engineering Foundation (KOSEF) grant R01-2009-0077987 funded by the Korean government (MOST).