1015-35-266 **Eric Bonnetier*** (Eric.Bonnetier@imag.fr), LMC-IMAG, BP 53, 38041 Grenoble, France, and **Sivaji Ganesh Sista** (sista.sivaji-ganesh@imag.fr), LMC-IMAG, BP 53, 38041 Grenoble, France. *Asymptotics for the voltage potential in a ε–periodic network with localized defects of size ε.* Preliminary report.

We consider a square lattice $h\mathbf{Z}^3$ in an open bounded subset $\Omega \subset \mathbf{R}^3$. In a reference configuration, each lattice point is connected to its 6 closest neighbors, by a link of conductivity k. In a perturbed configuration, a few of these links are defectuous and have different conductivities. We are concerned with detecting the location of defectuous conductors, by comparing the reference potentiel u_ε to the perturbed potential $u_{\varepsilon,d}$, far from the defective zone. We show that the first term in the expansion of $u_{\varepsilon,d}(m) - u_\varepsilon(m)$ has the form $\varepsilon^n \sum_{j=1}^{J} \nabla u(z_j) \cdot M_j \nabla_x G(z_j, m)$, where z_j are the centers of the defective links, where u and G are the potential and Green function of the effective continuous medium, limit of the reference medium as $\varepsilon \to 0$. The polarization tensors M_j describe the influence of the defects at infinity. The asymptotic structure of $u_{\varepsilon,d} - u_\varepsilon$ is thus similar to that obtained in the case of a continuous homogeneous medium perturbed by inclusions of small volume, which may prove interesting for numerical detection. (Received February 07, 2006)