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Vincent Hall, 206 Church St SE, Minneapolis, MN 55416. *An inverse problem in photolithography.*

Driven by the need to produce smaller and smaller features on computer chips, the process of photolithography is going through a kind of revolution. For example, it has become necessary to consider the wave nature of light in order to predict accurately the intensity of light produced by a mask. Indeed, it is through diffraction that features smaller than the wavelength of light used can be produced. In this presentation, we will give a simple introduction to the process of chip making through photolithography. We will describe an inverse problem that needs to be solved in order to produce desired patterns on a chip. The inverse problem is somewhat unusual in that the direct problem, as well as the parametrization of the unknown, are best described as level sets of functions. We show how the technique of level set can be used to solve the inverse problem, and discuss open challenges in this field. (Received September 25, 2005)