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Solving the inverse problem of metamaterials with permittivity measurement HON PING LEE, KA SHING HUI, KIN WAH YU, The Chinese University of Hong Kong — We have developed a new strategy for the reconstruction of volume fraction distribution of metallic inclusion in a graded composite from the measured electric permittivity data. Some of the techniques by Milton<sup>1</sup> and McPhedran<sup>2</sup> on homogenous two phase composites, together with Bergman-Milton representation, electromagnetic representation of effective permittivity and optimization method are used, and the strategy consist of the following two parts: reconstructing the effective permittivity in spectral space with Bergman representation by minimizing the cost function, and obtaining the volume fraction distribution by a contact of Bergman representation and electromagnetic representation of effective permittivity. Demonstration of the strategy is carried out by typical monotonically decreasing graded profile. The study could be extended to arbitrary profiles. The results obtained are useful for solving various inverse problems for the reconstruction of the structures of composites.

<sup>1</sup>R. C. McPhedran, G. W. Milton, Applied Physics A , Volume 26, Issue 4, pp 207-220 (December 1981)

<sup>2</sup>R. C. McPhedran and D. R. McKenzie, Appl. Phys. A 29, 19-27 (1982)

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