and $\bar{\bar{\Psi}}_b$ for inhomogeneous background are numerically solved by the forward solver. Singular value decomposition is taken to fix one portion of $\bar{\mathbf{a}}$ by using the deterministic subspace, which is denoted as $\bar{\mathbf{a}}^d$. Therefore the total electric field calculated in each step equals to the incident field plus the scattered field created by this $\bar{\mathbf{a}}^d$. The relative permittivity is then linearly retrieved by the reconstructed T-matrix. The positive relative permittivity present the dielectric scatterer while the negative one present the PEC scatterer.

2.2 Simulation Result

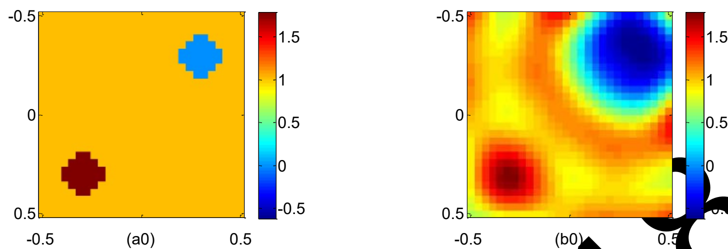

Figure 2. (a) Original pattern: one dielectric scatterer and one PEC scatterer (b) reconstructed pattern

The frequency used in the simulation is 300MHz. The domain is a square with side length 1m. One dielectric scatterer with relative perimittivity of 2 and a PEC coexist in the domain. It is highlighted that for convenience of figuring, the PEC is denoted by relative perimittivity of 0 in the original pattern, which has no physical meaning at all. The reconstructed result is as shown in Fig.2(b), which show that the method is able to distinguish the PEC and dielectric as well as quantitatively reconstruct the relative perimittivity.

3 Conclusion

A method which uses T- matrix method as the modelling method and S-DBIM as the iteration method is proposed to solve the imaging problem of PEC and dielectric scatterers. Simulation results show that the T-matrix modeling method is able to distinguish the PEC and dielectric and can retrieve the relative permittivity for dielectric scatterer at the same time.

Acknowledgements

This work was supported by the National Natural Science Fund of China Grant No. 61401009.

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