

Effective conductivity of tessellations in the plane

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The numerical method is suggested for obtaining effective conductivity of two-dimensional tessellations. For periodic structures the finite difference method with relaxation is used for solving Laplace equation with the corresponding matching conditions between components of a composite, and with corresponding periodic boundary conditions. The method allows one to obtain effective conductivity with high accuracy both when the perturbation theory is applicable and when the component conductivities significantly differ. The method has been applied to two-colored and three-colored periodic tessellations in the plane and has been compared with available analytical results.

[1] Л.Ю. Бараш, И.М. Халатников, Эффективная проводимость двумерных замощений плоскости: сравнение аналитических и численных результатов, в книге "Вычислительные технологии в естественных науках. Методы суперкомпьютерного моделирования" / Под ред. Р.Р. Назирова, Л.Н. Щура. М. : ИКИ РАН, 2014, стр. 25-32.

[2] Л.Ю. Бараш, И.М. Халатников, Эффективная проводимость прямоугольного и гексагонального замощений плоскости, ЖЭТФ, 148(2), 266-274 (2015).