

DIRICHLET'S PROBLEM FOR π -SYMMETRIC BOUNDARY VALUE FUNCTIONS

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The Dirichlet problem in the disk asks to find a bounded harmonic function u in the unit disk that assumes prescribed values $u(e^{i\theta}) = f(\theta)$ on the boundary, where the 2π -periodic function f is given.

If f is continuous, then the unique solution of Dirichlet problem is given by the Abel-Poisson means (see, e.g., [1, 3]) of trigonometric Fourier series of f . Another representation for that solution can be given using the Poisson integral.

In our previous research [2] we introduced the Fourier series of π -symmetric ($f(2\pi - x) = f(x)$) and 4π -periodic functions in form

$$f(x) \sim \frac{a_0}{2} + \sum_{k=1}^{\infty} (a_k \cos kx + d_k \sin (k - 1/2)x).$$

In this presentation we show that in some cases the π -symmetric Fourier series give a more convenient solution of the Dirichlet problem than the traditional trigonometric Fourier series.

REFERENCES

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