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Historical developments of computing of the inhomogeneous Dirichlet problem in bidimensional or multidimensional domains. (English) [Zbl 1391.35004](#)

Bull. Soc. Sci. Lett. Łódź, Sér. Rech. Déform. 63, No. 1, 33-41 (2013).

Summary: We present the question of solving and computing nonhomogeneous Dirichlet problems in domains in \mathbb{R}^2 or \mathbb{R}^n ($n \geq 2$). Using complex analysis we present the Kutta-Joukowski method of computing a bidimensional flow around a profile. In the case [*G. K. Batchelor*, An introduction to fluid dynamics. 2nd pbk-ed. Cambridge: Cambridge University Press (1999; [Zbl 0958.76001](#)); *L. D. Landau* and *E. M. Lifshits*, Fluid mechanics. 2nd ed. Transl. from the Russian by J. B. Sykes and W. H. Reid. Oxford etc.: Pergamon Press (1987; [Zbl 0655.76001](#))] of a three-dimensional flow around a cylindrical profile, we determine Sobolev spaces concerned and calculate by optimization methods an approximation of the solution by the use of Galerkin approximations [*M. Chipot*, Variational inequalities and flow in porous media. New York, NY: Springer (1984; [Zbl 0544.76095](#)); Elements of nonlinear analysis. Basel: Birkhäuser (2000; [Zbl 0964.35002](#)); *W. Rudin*, Real and complex analysis. 2nd ed. McGraw-Hill Series in Higher Mathematics. New York etc.: McGraw-Hill Book Comp. XII, 452 p. (1974; [Zbl 0278.26001](#))]. This problem arises in engineering science, thermal physics or dynamics of flows in porous media [[Zbl 0544.76095](#); *R. A. Silverman*, Complex analysis with applications. Englewood Cliffs, N. J.: Prentice-Hall, Inc. X, 274 p. (1974; [Zbl 0348.30001](#))].

MSC:

- [35-03](#) History of partial differential equations
- [01A60](#) History of mathematics in the 20th century
- [35J05](#) Laplace operator, Helmholtz equation (reduced wave equation), Poisson equation
- [30C35](#) General theory of conformal mappings
- [35A35](#) Theoretical approximation in context of PDEs

Keywords:

[Dirichlet problem](#); [flow profile](#); [Dirichlet beam](#)