

## **Connections between the Dirichlet, Neumann, and the mixed Dirichlet-Neumann problems for the Laplacian**

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### **Abstract**

The Neumann problem for a certain partial differential equation is in general harder to solve than the corresponding Dirichlet problem. In [1], [2], [3], we have shown that under certain smoothness assumptions on the boundary of the domain and of the boundary data, the Dirichlet and the Neumann problems (for the Laplace's equation and some other related PDE) are in fact “equally harder” to solve, in the sense that solving one problem leads immediately to the solution of the other (in particular, this gave an explicit representation of the Dirichlet-to-Neumann operator).

In the present talk we extend these results, by establishing a connection between the mixed Dirichlet-Neumann and the Dirichlet problem for the Laplace operator, and by exploring the case of weaker assumptions on the boundary data.

The talk is based on joint work with L. Beznea (IMAR, Bucharest, Romania) and N. R. Pascu (Kennesaw State University, Marietta, USA).

## **References**

- [1] L. Beznea, M. N. Pascu, N. R. Pascu, *Brosamler's formula revisited and extensions*, Analysis and Mathematical Physics 9 (2019), No. 2, pp. 747 - 760.
- [2] L. Beznea, M. N. Pascu, N. R. Pascu, *Connections between the Dirichlet and the Neumann problem for continuous and integrable boundary data*, Stochastic Analysis and Related Topics, Progress in Probability 72 (2017), Birkhauser, pp. 85 – 97.
- [3] L. Beznea, M. N. Pascu, N. R. Pascu, *An Equivalence Between the Dirichlet and the Neumann Problem for the Laplace Operator*, Potential Analysis 44 (2016), No. 4, pp. 655 - 672.