EVOLUTIONARY EQUATIONS WITH DYNAMIC BOUNDARY CONDITIONS

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In Lecture 12 of this year's ISem, [3], we have seen how to incorporate inhomogeneous boundary conditions or Robin-type boundary conditions in the framework of evolutionary equations. The latter was done in two ways. On the one hand, we discussed classical trace spaces for the operators grad and div and on the other hand we defined the so called *abstract boundary data spaces*, where the second way has the advantage that no regularity assumptions on the underlying domain Ω has to be imposed.
In this project we want to discuss different kinds of boundary conditions and how to deal with them within the framework of evolutionary equations. For doing so, we want to study the trace spaces of the third of the vector-analytic operators, curl, see [1].
Moreover, we study dynamic boundary conditions; that is, boundary conditions which are given in terms of a differential equation on the boundary, and show how they can be treated within the theory of evolutionary equations. The main source for this project will be [2].

This project is suited for 3 to 4 students.

References

[1] A. Buffa, M. Costabel, and D. Sheen. On traces for $\mathbf{H}(\mathbf{curl}, \Omega)$ in Lipschitz domains. *J. Math. Anal. Appl.*, 276(2):845–867, 2002.
[2] R. Picard, S. Seidler, S. Trostorff, and M. Waurick. On abstract grad-div systems. *J. Differ. Equations*, 260(6):4888–4917, 2016.
[3] C. Seifert, S. Trostorff, and M. Waurick. Evolutionary Equations. ISem 23 Lecture Notes, 2020.