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Inverse boundary value problems in reflexive Banach spaces

In very recent work, a "collage method" for solving inverse boundary value problems has been established. The framework for the approach is built upon the Lax-Milgram theorem, cast within a Hilbert space H. In this talk, we extend both the Lax-Milgram theorem and the collage method to the setting of reflexive Banach spaces. We see that the formulation includes the earlier framework as a special case. As an example, we consider the simple boundary value problem -d/dx(K(x)du/dx)=f(x), x in [0,1], u(0)=0, u(1)=0, with f(x) in a non-Hilbertian space. We demonstrate that the new approach performs very well in solving a related inverse problem, while, not unexpectedly, the Hilbert-space based approach performs very poorly.