Proper homotopy classes of Fredholm mappings

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Many ODE and PDE problems can be formulated as finding zero sets of non-linear (proper) Fredholm mappings f from a Hilbert manifold M to a Hilbert space H.

In this talk, I will discuss a complete invariant for these mappings. This invariant is based on a classical idea from finite dimensional differential topology: framed cobordism and the Pontryagin-Thom construction. I will recall this construction and discuss how the Pontryagin-Thom construction has to be modified to be useful in the infinite dimensional world. No previous knowledge about framed cobordism and the Pontryagin-Thom construction will be assumed.

This is joint work with Alberto Abbondandolo, Michael Jung and Lauran Toussaint.