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P. Robert Kotiuga*, Boston University ECE Dept., 8 Saint Mary's Street, Boston, MA 02215.
Near force-free magnetic fields, contact structures, open book decompositions, and Heegaard-Floer homology. Preliminary report.

In previous publications "near force-free magnetic fields" were associated with confoliations, and a conjecture relating the Thurston and Alexander norms of a current-carrying force-free knot was made. It turns out that the work of Emanuel Giroux on open book decompositions supporting a contact structure formalizes the introduction of topological invariants from knot and link theory into the study of force-free magnetic fields.

One approach to computing a force-free magnetic field is to solve an eigenvalue problem for the curl operator on a compact 3-d manifold with boundary. In this case, one needs to investigate the self-adjoint extensions of the curl operator. It turns out that the symplectic version of the Gelfand-Krein-Naimark theorem applied to finding self-adjoint extensions of "natural" curl operators, is intimately related to the Heegaard-Floer homology which, in turn, relates Thurston and Alexander norms.

This talk will develop these connections. (Received August 19, 2008)