Almost Pontryagin spaces

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We are going to define a generalization of the concept of Pontryagin spaces to the case of degenerated scalar products. In the classical situation it is well known that every Pontryagin space carries a unique Hilbert space topology such that it is isomorphic (algebraically and topologically) to the cartesian product of a Hilbert space and a finite dimensional anti-Hilbert space. If the scalar product is degenerated, then this topology is in general not uniquely determined. Therefore, it appears to be appropriate to include the topology into the definition of almost Pontryagin spaces.

On these spaces one can do operator theory as well as on Pontryagin spaces. We will also see examples of how it is possible to solve some interpolation and extrapolation problems using operator theoretical methods on almost Pontryagin spaces.