Neutral invariant subspaces of Hamiltonian operators

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The so-called Hamiltonian operator from control theory is a block operator matrix which is connected to two Krein space fundamental symmetries J_1 and J_2: it is J_1-skew-symmetric and J_2-accretive. In this talk, Hamiltonians with compact resolvent and a Riesz basis with parentheses of root vectors are considered. The existence of infinitely many invariant subspaces of the Hamiltonian which are hypermaximal J_1-neutral is established; one of these subspaces is J_2-nonnegative, one J_2-nonpositive. Under additional assumptions, these subspaces are shown to be the graphs of selfadjoint operators, which in turn satisfy an operator Riccati equation.