A family index theorem for periodic Hamiltonian systems and bifurcation

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Session: 38. Variational Methods in Nonlinear Analysis

We introduce an index theorem for families of linear periodic Hamiltonian systems, which is reminiscent of the Atiyah-Singer index theorem for selfadjoint elliptic operators. For the special case of one-parameter families, we compare our theorem with a classical result of Salamon and Zehnder. Finally, we use the index theorem to study bifurcation of branches of periodic solutions for families of nonlinear Hamiltonian systems.