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In the context of the averaging method, we study a class of perturbed Hamiltonian dynamics on the so-called “slow-fast” G -spaces equipped with Poisson brackets of the adiabatic type. The main feature of our perturbed Hamiltonian model is that the unperturbed part is G -invariant but not Hamiltonian. To get a G -symmetric Hamiltonian approximation to the original system, we construct a normalization transformation by using the homotopy method for weak coupling Poisson structures. In particular, in the adiabatic case, our approach can be viewed as an alternative to the method of generating functions which is common in the theory of adiabatic approximation. (Received January 18, 2010)