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Cohomology of $SL(2, C)$ character varieties of surface groups and the action of the Torelli group.

We determine the action of the Torelli group on the equivariant cohomology of the space of flat $SL(2, C)$ connections on a closed Riemann surface. We show that the trivial part of the action contains the equivariant cohomology of the even component of the space of flat $PSL(2, C)$ connections. The non-trivial part consists of the even alternating products of degree two Prym representations, so that the kernel of the action is precisely the Prym-Torelli group. We compute the Betti numbers of the ordinary cohomology of the moduli space of flat $SL(2, C)$ connections. Using results of Cappell-Lee-Miller we show that the Prym-Torelli group, which acts trivially on equivariant cohomology, acts non-trivially on ordinary cohomology. (Received September 15, 2008)