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Complex structure on the extended moduli space

(Joint work with Yukai Zhang) Let Σ be a surface of genus g and let $G = SU(2)$. The extended moduli space was defined by the author (Math. Annalen, 1994). It is a space of dimension $6g$ with a symplectic structure on an open dense subset. It is the symplectic quotient of the space of flat $SU(2)$ connections on Σ by the based gauge group (the subgroup $\mathcal{G}_0$ of the gauge group $\mathcal{G} = C^\infty(\Sigma, G)$ that takes a basepoint to the identity element). Since the quotient of the gauge group by the based gauge group is G, the extended moduli space is a finite-dimensional space equipped with a Hamiltonian action of G. We exhibit a compatible almost complex structure on the extended moduli space and show that this almost complex structure is integrable.