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The Atiyah-Bott Fixed Point Theorem for the Based Loop Group

The Atiyah-Bott fixed point theorem for elliptic complexes is a powerful tool to compute the Lefschetz number of an elliptic operator in terms of data around the fixed points of a compact Lie group action. It has various applications in geometry and representation theory, including a new way to prove the Weyl character formula for semisimple Lie algebras. In that case, the rational functions one multiplies at each fixed point is given by the Weyl denominator.

The based loop group of a compact group K has a natural action by its maximal torus T and a rotation action by the circle S^1, these two actions commute. We extend the Atiyah-Bott formula to the based loop group of $\Omega SU(2)$ and provide a formula for the rational functions one must multiply at each fixed point of the $T \times S^1$ action. This is done by applying the Atiyah-Bott theorem on a filtration of $\Omega SU(2)$ comprised of finite-dimensional spaces and taking a limit.