The J-flow on Kähler surfaces

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Abstract

Donaldson defined a parabolic flow on Kähler manifolds which arises from considering the action of a group of symplectomorphisms on the space of smooth maps between manifolds. One can define a moment map for this action, and then consider the gradient flow of the square of its norm. This is called the J-flow, since it corresponds to the gradient flow of Chen's J-functional, which is related to Mabuchi's K-energy.

We will show that in the case of Kähler surfaces with two Kähler forms satisfying a certain condition, the J-flow converges to a zero of the moment map. The proof uses a Moser iteration argument and the α-invariant of Tian and Yau. We will discuss the possibility of singularities forming in this flow and how this may relate to the geometry of the surface.