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## The Kähler Ricci flow and the solutions to the conjugate heat equation

We consider the class  $\mathcal{A}$  of those solutions  $u(x, t)$  to the conjugate heat equation  $\frac{d}{dt}u = -\Delta u + Ru$  on compact Kähler manifolds  $M$  with  $c_1 > 0$  (where  $g(t)$  changes by the unnormalized Kähler Ricci flow, blowing up at  $T < \infty$ ), which satisfy Perelman's differential Harnack inequality on  $[0, T)$ . We show  $\mathcal{A}$  is nonempty. If  $|\text{ric}(g(t))| \leq \frac{C}{T-t}$ , which is always true if we have a type I singularity, we prove the solution  $u(x, t)$  satisfies the elliptic type Harnack inequality, with constants that are uniform in time. If the flow  $g(t)$  has a type I singularity at  $T$ , then  $\mathcal{A}$  has exactly one element.