Title: Gradient estimates for a weighted nonlinear equation on complete noncompact manifolds

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Ma, Huang and Luo [12] considered \( \Delta u + cu^\alpha = 0 (\alpha < 0) \) with \( \text{Ric}_{ij} \geq -Kg_{ij} \), and obtained some gradient estimates. In the present paper, we investigate the weighted nonlinear equation \( \Delta_f u + cu^{-\alpha} = 0 \) with \( \text{Ric}_f^N \geq -K \), where \( f \) is a smooth real-valued function on a complete noncompact Riemannian manifold \((M^n, g)\), \( \alpha > 0 \) and \( c \) are two real constants, and we achieve some gradient estimates for positive solutions of this weighted nonlinear equation. The results posed in this paper can be regarded as a natural generalization of the results in [12].

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