The dual ultracontractivity and its applications

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Let $\{T_t\}$ be a semigroup associated with a symmetric Dirichlet form $\mathcal{E}$. The semigroup is called ultracontractive if it sends L^1 into L^∞. This property is well-studied and many criteria are known. But we are interested in the boundedness of the semigroup as a map from L^∞ into L^1. Let us call this property as a dual ultracontractivity. We give some conditions for the dual ultracontractivity. We also give applications, in particular, for one dimensional diffusions. We will see that it has a close relation with the asymptotic behavior of the life time.