Abstract

In this paper, we consider symmetric jump processes of mixed-type on metric measure spaces under general volume doubling condition, and establish stability of two-sided heat kernel estimates and heat kernel upper bounds. We obtain their stable equivalent characterizations in terms of the jumping kernels, variants of cut-off Sobolev inequalities, and the Faber-Krahn inequalities. In particular, we establish stability of heat kernel estimates for α-stable-like processes even with $\alpha \geq 2$ when the underlying spaces have walk dimensions larger than 2, which has been one of the major open problems in this area.