

# Heat kernels of non-symmetric discontinuous Markov processes

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Suppose that  $j(x) = j(|x|)$  is the Lévy density of a subordinate Brownian motion satisfying certain weak scaling conditions. Consider the following non-local and non-symmetric Levy-type operator on  $\mathbf{R}^d$ :

$$L^\kappa f(x) = \text{p.v.} \int_{\mathbf{R}^d} (f(x+z) - f(x)) \kappa(x, z) j(|z|) dz$$

where  $0 < \kappa_0 \leq \kappa(x, z) \leq \kappa_1$ ,  $\kappa(x, z) = \kappa(x, -z)$  and  $|\kappa(x, z) - \kappa(y, z)| \leq \kappa_2 |x - y|^\beta$  for some  $\beta \in (0, 1)$ . We construct the fundamental solution  $p^\kappa(t, x, y)$  of  $L^\kappa$  and obtain estimates on  $p^\kappa(t, x, y)$ . The fundamental solution  $p^\kappa(t, x, y)$  gives rise to a Feller process on  $\mathbf{R}^d$ .

Joint work with Panki Kim and Zoran Vondracek