

$$\begin{aligned}
f_{h,\varepsilon}(x, y) &= \varepsilon \mathbf{E}_{x,y} \int_0^{t_\varepsilon} L_{x,y_\varphi(\varepsilon u)} \varphi(x) du \\
&= h \int L_{x,z} \varphi(x) \rho_x(dz) \\
&\quad + h \left[\frac{1}{t_\varepsilon} \left(\mathbf{E}_y \int_0^{t_\varepsilon} L_{x,y^x(s)} \varphi(x) ds - t_\varepsilon \int L_{x,z} \varphi(x) \rho_x(dz) \right) + \right. \\
&\quad \left. \frac{1}{t_\varepsilon} \left(\mathbf{E}_y \int_0^{t_\varepsilon} L_{x,y^x(s)} \varphi(x) ds - \mathbf{E}_{x,y} \int_0^{t_\varepsilon} L_{x,y_\varphi(\varepsilon s)} \varphi(x) ds \right) \right] \tag{1}
\end{aligned}$$