

$$\begin{aligned} {}^z\overline{\mathcal{P}\eta} &= {}^z\overline{\mathcal{P}_S\eta} = \int_{du}^S {}^z\Delta_u^{-d/r} u \eta \\ {}^z\mathcal{P}_u &= {}^z\Delta_u^{-d/r} \end{aligned}$$