$$\hat{\gamma}_{a}(x) = -ik\hat{\Gamma}w^{0,1-\beta}(x)2^{\beta-1} + w^{\alpha,-\beta}(x)\hat{\gamma}_0 + w^{\alpha,1-\beta}(x)\sum_{n=1}^{\infty}\gamma_n \hat{P}_n^{0,1-\beta}(x)$$