$\Delta\lambda/\lambda$ will be small, so that $r \lesssim 0.1$ seems a reasonable upper limit.

Model C: This model illustrates what can happen if we begin a serious proliferation of quarks; in addition to the standard four, two new quarks p'' and X are introduced here. In order to suppress the K_L^0-K_S^0 mass differences we require that $m_{p''}$ not exceed a few GeV -- for this equation p'' plays the role assigned to p' in model A. Here, however, we are concerned with D^0-$\bar{D}^0$ mixing, where there are bound states of $(p', \bar{p})$ and $(\bar{p}', p)$ pairs. The point of the present model is that if m_X is made large enough one can achieve a large mass difference Δm, as we see from the obvious generalization of Eq. (3). That is, with large enough m_X one can achieve large $\Delta m/\lambda$ and therefore substantial mixing, $r \approx 1$.

Model D: This model is designed to produce a non-diagonal neutral current with the quantum numbers of $\bar{p}'p + \bar{p}p'$. Thus Δm is first order weak, whereas $\Delta\lambda$ is second order weak, so $\Delta m/\lambda \gg 1$ and the mixing is essentially complete, $r \approx 1$. The mass of the X quark plays no role here. For economy we might be tempted to identify X with the "usual" λ quark. This would introduce right-handed currents for ordinary semileptonic $\Delta S = 0$ or $\Delta S = 1$ processes. Experimentally there is perhaps room for such currents at the 10% level. This degree of suppression could of course be achieved by choosing a small enough value for the mixing angle α, $\alpha \lesssim 0.1$.

Let us abstract some lessons from these models and from others that one can contemplate in the general $SU(2) \times U(1)$ framework that we have been considering. If mixing effects beyond $r \approx 10^{-3}$ were to be