Clearly the current to the left across the interface at $x = 0$ as defined by Eq. 26 is just $G(0)$, which, according to the above equation, is

$$I = G(0) = f\ F(0) + I\nu F_S/(1 + f) \tag{34}$$

where

$$F_S = \sum_{i=1}^{3} F_i$$

We are left with the problem of finding $F(0)$ if the current is to be calculated by Eq. 34.

Consider now the homogeneous integral equation (i.e., set $\phi = 0$ in Eq. 29). The homogeneous solutions in the regions $x \geq 0$ and $x < 0$ are designated with a zero subscript. They are respectively, $f_0(x)$ and $g_0(x)$ and their Laplace transforms were shown to be given by the following expressions derived exactly by Frankel and Nelson in (LA-258).

$$F_0(k) = [B/(k^2 + k_0^2)] \exp[(k/n) \int_0^1 d_s T_c/(1 + ks)] \tag{35}$$

$$G_0(k) = [Bf/k_0^2] \exp[(k/n) \int_0^1 d_s T_c/(1 - ks)] \tag{36}$$

where

$$T_c = \tan^{-1}\left(\frac{n/2}{\tanh^{-1} s - 1/Cs}\right) c = 1 + f$$

The constant k_0 is given by the relation,

$$k_0/\tan^{-1} k_0 = 1 + f \tag{37}$$

In Appendix II of (LA-258) it is shown that the particular solution of Eq. 29, where $\phi(x)/(1 + f)$ is a single exponential term, $e^{-\alpha x}$, has the Laplace transform,

$$F(k) = -F_0(k)/[(k + \alpha)\ G_0(-\alpha)] \tag{38}$$

For our problem the inhomogeneous term is a sum of exponentials, $\phi(x)$ being given by Eq. 22. The general solution thus has the Laplace transform

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