making comparable contributions to the cross section. These effects, however, become less serious as one goes to large energies. There is also the problem of scaling breakdown at the other end, for $q^2 < q_1^2$. The low q^2 region ($q^2 < q_1^2$) contributes significantly to the cross sections even for $2m\mathcal{E}$ substantially larger than q_1^2. It has always been something of a puzzle, therefore, even when strict scaling is assumed to hold beyond $q_1^2 \approx (\mathrm{GeV})^2$, why the total cross sections become so nearly linear in $\mathcal{E}$ already at a few GeV. These uncertainties about scaling breakdown at low q^2 make themselves felt in our computations here, although the effects become unimportant for large beam energies. In practice we have simply cut off all q^2 integrations below $q_1^2 = 1.0(\mathrm{GeV})^2$. For all of these reasons we restrict ourselves to large energies $\mathcal{E}$. For the remaining parameter, the scale μ^2, we take $\mu^2 = 0.5\, m^2$, where m is the proton mass.

(i) The y-distribution:

From Eqs. (3) and (4), and ignoring the longitudinal structure function F_L, we have

$$\frac{\partial\sigma^{(\nu,\bar{\nu})}}{\partial y} = \frac{G^2 m\mathcal{E}}{\pi}\left\{\left(1-y+\frac{y^2}{2}\right)H(\mathcal{E}y) \pm y\left(1-\frac{y}{2}\right)K(\mathcal{E}y)\right\},$$

$$H(\mathcal{E}y) = \int_0^1 dx\, F_2(x, q^2 = 2m\mathcal{E}yx), \tag{27}$$

$$K(\mathcal{E}y) = -\int_0^1 dx\, x\, F_3(x, q^2 = 2m\mathcal{E}yx).$$