PROOF OF FORMULA 3.562.5

$$\int_0^\infty x^2 e^{-\beta x^2} \cosh \gamma x \, dx = \frac{\sqrt{\pi}(2\beta + \gamma^2)}{8\beta^2\sqrt{\beta}} e^{\gamma^2/4\beta} \text{erf}\left(\frac{\gamma}{2\sqrt{\beta}}\right) + \frac{\gamma}{4\beta^2}$$

Entry **3.562.4** states that

$$\int_0^\infty x e^{-\beta x^2} \cosh \gamma x \, dx = \frac{\gamma}{4\beta}\sqrt{\frac{\pi}{\beta}} e^{\gamma^2/4\beta} \text{ erf}\left(\frac{\gamma}{2\sqrt{\beta}}\right) + \frac{1}{2\beta}.$$

The current integral follows by differentiating with respect to γ.