

$\omega$

$$\frac{(-1 + \text{Cosh}[v_{\#0}]) \text{Csch}[v_{\#0}]}{v_{\#0}}$$

Small  $v_{\#0}$  series

$$\frac{1}{2} - \frac{v_{\#0}^2}{24} + O[v_{\#0}]^3$$

Large  $v_{\#0}$  asymptotic

$$\frac{1}{v_{\#0}} - \frac{2 e^{-v_{\#0}}}{v_{\#0}}$$

(check)

True

$d\omega/dv_{\#0}$

$$\frac{-\text{Sinh}[v_{\#0}] + v_{\#0}}{(1 + \text{Cosh}[v_{\#0}]) v_{\#0}^2}$$