

Mathematical equations of hyperbel functions

See: Papula, L., (2003), *Mathematische Formelsammlung*, Vieweg

$$F_{abu}(x/a) = [\tanh(x/a)+1] / [\tanh(x_u/a)+1] \quad [1u]$$

$$F'_{abu}(x/a) = \tanh(x/a) \text{ with } \tanh(x_u/a)=0 \quad [2u]$$

$$F'_{abu}(x/a) = \frac{v^2(x/a) - u^2(x/a)}{a v^2(x/a)} \quad [3u]$$

$$F'_{abu}(x/a) = \frac{4}{a [e^{x/a} + e^{-x/a}]^2} = \frac{1}{a \cosh^2(x/a)} \quad [4u]$$