II.D.1.d. Derivatives of logarithmic external R-function

Derivatives of R^{ext} with respect to the u-parameters are found from Eqs. (II B1 d.1) and (II B1 d.2) to be of the form

$$\frac{\partial R_c^{ext}}{\partial E_c^{up}} = -\frac{s_{con,c} + s_{lin,c}\, E_c^{up}}{E_c^{up} - E} \quad , \tag{II D1 d.1}$$

$$\frac{\partial R_c^{ext}}{\partial E_c^{down}} = -\frac{s_{con,c} + s_{lin,c}\, E_c^{down}}{E - E_c^{down}} \quad , \tag{II D1 d.2}$$

$$\frac{\partial R_c^{ext}}{\partial \bar{R}_{con,c}} = 1 \quad , \tag{II D1 d.3}$$

$$\frac{\partial R_c^{ext}}{\partial \bar{R}_{lin,c}} = E \quad , \tag{II D1 d.4}$$

$$\frac{\partial R_c^{ext}}{\partial \bar{R}_{q,c}} = E^2 \quad , \tag{II D1 d.5}$$

$$\frac{\partial R_c^{ext}}{\partial \sqrt{s_{con,c}}} = -2\sqrt{s_{con,c}}\, \ln\left[\frac{E_c^{up} - E}{E - E_c^{down}}\right] \quad , \tag{II D1 d.6}$$

and

$$\frac{\partial R_c^{ext}}{\partial s_{lin,c}} = -\left(E_c^{up} - E_c^{down}\right) - E\, \ln\left[\frac{E_c^{up} - E}{E - E_c^{down}}\right] \quad . \tag{II D1 d.7}$$