T Model with Body Effect

The T model of the MOSFET is shown in Fig. 1. The resistor r_0 is given by Eq. (**??**). The resistors r_s and r_{sb} are given by

$$r_s = \frac{1}{g_m} \tag{1}$$

$$r_{sb} = \frac{1}{g_{mb}} = \frac{1}{\chi g_m} = \frac{r_s}{\chi} \tag{2}$$

where g_m and g_{mb} are the transconductances defined in Eqs. (**??**) and (**??**). The currents are given by

$$i_d = i_{sg} + i_{sb} + \frac{v_{ds}}{r_0} \tag{3}$$

$$i_{sg} = \frac{v_{gs}}{r_s} = g_m v_{gs} \tag{4}$$

$$i_{sb} = \frac{v_{bs}}{r_{sb}} = g_{mb} v_{bs} \tag{5}$$

The currents are the same as for the hybrid-π model. Therefore, the two models are equivalent. Note that the gate and body currents are zero because the two controlled sources supply the currents that flow through r_s and r_{sb}.
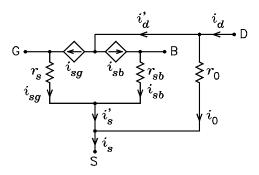

Figure 1: T model of the MOSFET.