Corrections to the Equations in the 1995 VDMOS Model Paper

Many equations are incorrect in the VDMOS model paper by I. Budihardjo and P. O. Lauritzen, " The lumped-charge power MOSFET model, including parameter extraction", IEEE Trans. Power Electronics, Vol. 10, No. 5, May 1995.

The corrected equations are listed below. Equations that are not listed should be correct in the original paper. If you find additional corrections or changes please send them to: plauritz@ee.washington.edu.

1. The equation in the text following (5) should be: $g_B^2 = \left[(V_{TB} - V_{fbB} - f_{SB})^2 / f_{SB}\right] = G_B$
2. Equation (14) should be: $q_{adD} = \mp C_{GDon} g_D \sqrt{(f_t \times e^{(y_{SD}/f_t)} - y_{SD} - f_t)}$
3. Equation (15) should be: $q_{iD} = Q_{CD} - q_{adD}$
4. The equation immediately following (15) should be: $C_{GDon} g_D = A_{drain}\sqrt{2qe_sN_D}$ where A_{drain} is the cross-sectional area of the drain.
5. In Equation (16) the symbol q_{daD} should be q_{adD}.
6. The symbol G_D , which is first used in (23), is defined in (29) and (B10)
7. In (27) V_{GDH} and V_{GDL} are the gate-drain voltages at the intersections of regions 4 & 3 in Figure 6.
8. Equation (28) should be:

   $$Q_{GL} = \frac{C_{GDon}G_D}{2}\left[-1 + \left(1 - \frac{4(V_{GDL} - V_{fbD})}{G_D}\right)^{1/2}\right] + C_{GDon}(V_{GSM} - V_{fbD})$$

   where V_{GSM} is the gate-source "Miller" voltage in the horizontal region of Figure 6.
9. The first sentence in Appendix A and Equation (A1) should be: The interface charge Q_{CD} described in equation H5 of Appendix H of [12] for an N-type substrate can be expressed by

   $$Q_{CD} = \mp A_{drain}\sqrt{2qe_sN_D}$$

   $$\cdot\sqrt{\left\{ j_t \exp\left(\frac{y_{sD}}{f_t}\right) - y_{sD} - f_t + \exp\left(\frac{-2f_{FN}}{f_t}\right)\cdot\Big[f_t \exp\left(\frac{-y_{sD} + V_{BD}}{f_t}\right) + y_{sD} - f_t \exp\left(\frac{V_{BD}}{f_t}\right)\Big]\Big]\right\}}$$

10. Equation (A2) should be: $q_{adD} = \mp C_{GDon} g_D \sqrt{\left(f_t \times e^{(y_{sD}/f_t)} - y_{sD} - f_t\right)}$
11. Equation (A3) should be: $q_{iD} = Q_{CD} - q_{adD}$
12. Equation (A4) should be: $y_{sD} = v_{GD} - V_{fbD} + \dfrac{q_{iD} + q_{adD}}{C_{GDon}}$
13. Equations (B6) and (B8) should be: $K_p = \dfrac{WmC_{GSon}}{LA_{body}}$ where A_{body} is the area of the body.
14. Equation (B7) should be: $V_{TB} = V_{fbD} + f_{SB} + \sqrt{(G_B f_{SB})}$
15. Equation (B9) should be: $\sqrt{G_B} = g_B = A_{body}\sqrt{\dfrac{2qe_sN_A}{C_{GSon}^2}}$
16. Equation (B10) should be: $\sqrt{G_D} = g_D = A_{drain}\sqrt{\dfrac{2qe_sN_D}{C_{GDon}^2}}$
17. Equation (B13) should be: $V_{TD} = V_{fbD} - f_{DB} - \sqrt{(G_D f_{DB})}$

Latest update: April 11, 2001 by plauritz@ee.washington.edu