BSIM 4.6.5 Bug Report

Reported by
Jushan Xie, Cadence

Bugfix Assistance:
Jushan Xie, Cadence
Samuel Mertens, Ansoft
BSIM4.6.5 Bug Fix

- Source and Drain diode current shows unphysical and high values for Aseff=Pseff=Adeff=Pdeff=0, although it shows correct prediction for positive values of Aseff, Pseff, Adeff and Pdeff.

- Action:
  - If Aseff, Pseff, Adeff, Pdeff are negative, their values are set to ‘0’.
  - For Aseff && Pseff = 0, source side diode is turned off by setting SourceSaturationCurrent=0.0
  - For Adeff && Pdeff = 0, drain side diode is turned off by setting DrainSaturationCurrent=0.0

(Code with red font is replaced by that with blue.)
if (here->BSIM4sourcePerimeterGiven)  
{ if (model->BSIM4perMod == 0)
    here->BSIM4Pseff = here->BSIM4sourcePerimeter;
  else
    here->BSIM4Pseff = here->BSIM4sourcePerimeter
  - pParam->BSIM4weffCJ * here->BSIM4nf;
} b4temp.c (1742-1748)

if (here->BSIM4sourcePerimeterGiven)  
{ if (here->BSIM4sourcePerimeter == 0.0)
    here->BSIM4Pseff = 0.0;
  else if (here->BSIM4sourcePerimeter < 0.0)
    { printf("Warning: Source Perimeter is specified as negative, it is set to zero.\n");         
      here->BSIM4Pseff = 0.0;}
  else
  { if (model->BSIM4perMod == 0)
      here->BSIM4Pseff = here->BSIM4sourcePerimeter;
    Else
      here->BSIM4Pseff = here->BSIM4sourcePerimeter - pParam->BSIM4weffCJ * here->BSIM4nf;
  }
}
if (here->BSI M4drainPerimeterGiven)                  [Drain side]
{ if (model->BSI M4perMod == 0)
  here->BSI M4Pdeff = here->BSI M4drainPerimeter;
  else
  here->BSI M4Pdeff = here->BSI M4drainPerimeter
  - pParam->BSI M4weffCJ * here->BSI M4nf;
}  b4temp.c (1758-1763)

if (here->BSI M4drainPerimeterGiven)                  [Drainside]
{ if (here->BSI M4drainPerimeter == 0.0)
  here->BSI M4Pdeff = 0.0;
  else if (here->BSI M4drainPerimeter < 0.0)
  { printf("Warning: Drain Perimeter is specified as negative, it is set to zero.\n"");
    here->BSI M4Pdeff = 0.0;}
  else
  { if (model->BSI M4perMod == 0)
    here->BSI M4Pdeff = here->BSI M4drainPerimeter;
    Else
    here->BSI M4Pdeff = here->BSI M4drainPerimeter - pParam->BSI M4weffCJ * here->BSI M4nf;
  }
}
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if ((here->BSIM4Aseff <= 0.0) && (here->BSIM4Pseff <= 0.0)) [Source side]
    {   SourceSatCurrent = 1.0e-14;
    }
    b4ld.c (664-666), b4temp.c (1854-1856)

if ((here->BSIM4Aseff <= 0.0) && (here->BSIM4Pseff <= 0.0)) [Source side]
    {   SourceSatCurrent = 0.0;
    }

if ((here->BSIM4Adeff <= 0.0) && (here->BSIM4Pdeff <= 0.0)) [Drain side]
    {   DrainSatCurrent = 1.0e-14;
    }
    b4ld.c (762-764), b4temp.c (1912-1914)

if ((here->BSIM4Adeff <= 0.0) && (here->BSIM4Pdeff <= 0.0)) [Drain side]
    {   DrainSatCurrent = 0.0;
    }