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// Tunnel diode Verilog-A compact device model.
// Verilog-A code translated, by hand, from
// MAPP model.
//
`include "disciplines.vams"
`include "constants.vams"
//
module TD(p,n);
inout p,n;
electrical p,n;
//
parameter Is=1e-12 from [1e-20 : inf);
parameter Ip=1e-5 from [1e-20 : inf);
parameter Iv=1e-6 from [1e-20 : inf);
parameter Vp=0.1 from [1e-20 : inf);
parameter Vv=0.4 from [1e-20 : inf);
parameter KTD = 5 from [1e-20 : inf);
parameter VT=0.025 from [1e-20 : inf);
parameter C=1e-15 from [1e-20 : inf);
//
real Idiode, lexcess, Itunnel;
//
analog begin
Idiode = Is*(exp(V(p,n)/VT)-1.0);
lexcess = Iv*exp(KTD*(V(p,n)-Vv));
Itunnel = Ip*(V(p,n)/Vp)*exp(Vp-V(p,n)/Vp);
I(p,n) <+ Idiode+lexcess+Itunnel;
I(p,n) <+ ddt(C*V(p,n));
end
endmodule

```

