

3.1 Numerical Calculation of Field and Depletion Area in Diode

Use the document on the Web Site ('Additional Documents') about the general solution of field/potential in doped structures to write a program which implements this method. Graphics output is not really necessary. A listing of numerical values (mainly $\Phi(x)$) is sufficient.

1. Check that constant doping leads to $E(x)$ as used in previous exercise.
2. Check that the structure behaves as expected when you double the doping or halve the thickness.
3. What happens if the bulk doping changes from n -type to p -type? (This can happen due to irradiation of the sensor.)
4. You could also implement an Avalanche Photo Diodes (APD) with a thin p^{++} (backside) surface layer, $200\ \mu\text{m}$ p^- bulk, some microns p^+ and a thin n^{++} surface layer.