In this work, we will try to reduce the general three-dimensional problem into a one-dimensional one, and carry out the one-dimensional modeling and simulations for 2D-Planar-Electrode detectors (in Cartesian coordinate) and 3D-Trench-Electrode detectors (in cylindrical coordinate).

2. The electric potential and the electric field can be obtained by solving the Poisson equation:

\[ \nabla^2 \phi = \frac{\rho}{\varepsilon} \]

(1)

3. The weighting potential \( W(x) \) and field can be obtained by solving the Laplace equation:

\[ \nabla^2 W = 0 \]

(2)

4. To convert into \( r \)-type bulk material, we need to do the following interchanges in the figures and equations:

\[ \begin{align*}
\Delta x & \rightarrow r \\
\Delta y & \rightarrow z \\
\Delta z & \rightarrow y
\end{align*} \]

(3)

5. Conventional 3D-Column-Electrode Detectors

6. Weighting field for the cylindrical 3D-Trench-Electrode detectors and its approximation for 3D-Column-Electrode detectors

7. 3D-Trench-CJ

8. 3D-Trench-CJ

9. Conventional 3D-Column-Electrode Detectors

10. Weighting field for the cylindrical 3D-Trench-Electrode detectors and its approximation for 3D-Column-Electrode detectors

References


