

Kernel “Independent” Technique

Basic requirements:

Reciprocity: $G(\vec{r}, \vec{r}') = G(\vec{r}', \vec{r})$

Shift invariance: $G(\vec{r} + \Delta\vec{r}, \vec{r}' + \Delta\vec{r}) = G(\vec{r}, \vec{r}')$

Commonly used Green’s function all satisfy these requirements

$$\frac{1}{|\vec{r} - \vec{r}'|}, \quad \frac{e^{ik|\vec{r} - \vec{r}'|}}{|\vec{r} - \vec{r}'|}, \quad \frac{\partial}{\partial n} \left(\frac{1}{|\vec{r} - \vec{r}'|} \right), \quad \frac{\partial}{\partial n} \left(\frac{e^{ik|\vec{r} - \vec{r}'|}}{|\vec{r} - \vec{r}'|} \right)$$