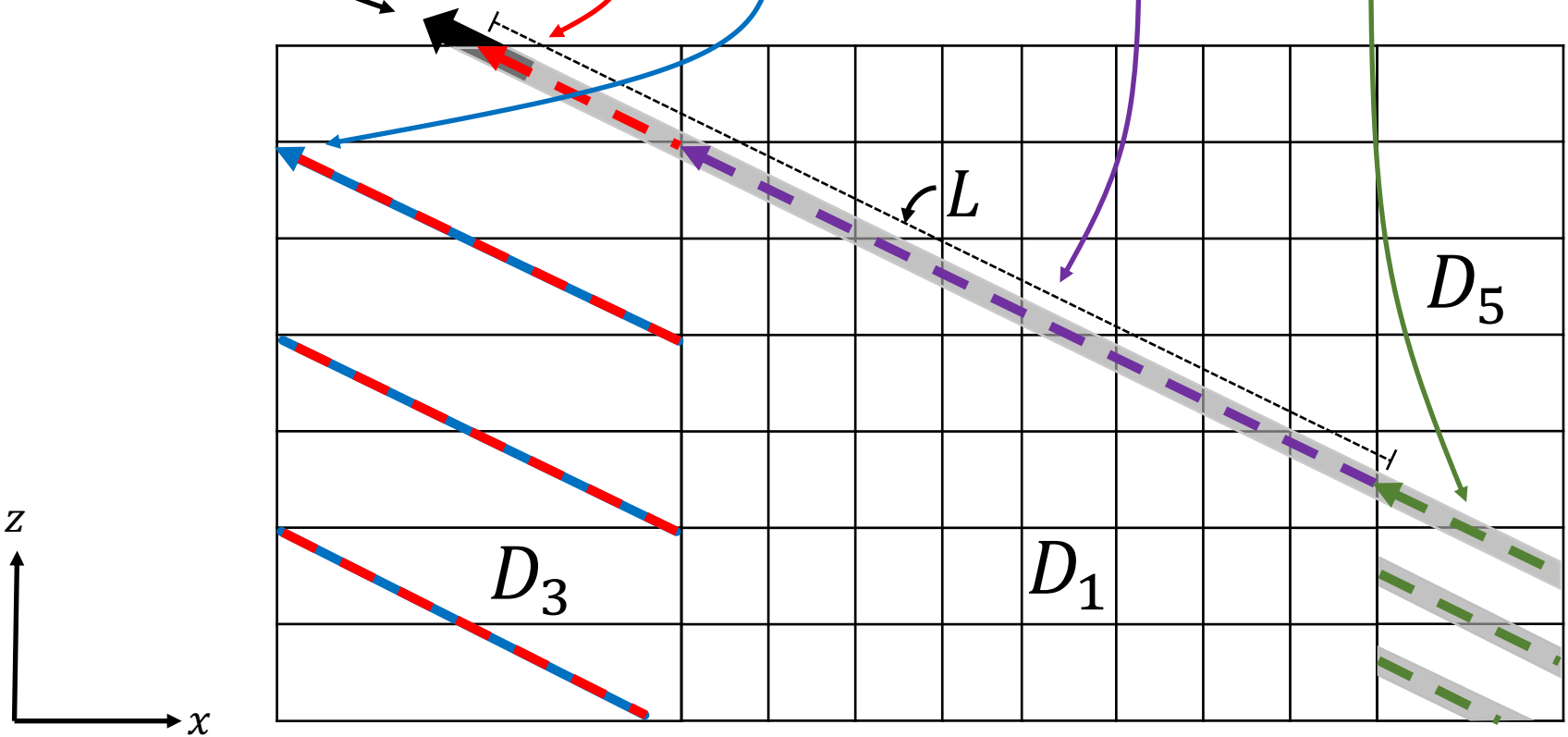$$\boldsymbol{I}(\boldsymbol{r}_{ik}, \boldsymbol{\Omega}_{ik}) = \left\langle \boldsymbol{q}_{ik,3}, \boldsymbol{I}_3 - \mathcal{T}\left[\boldsymbol{I}_3\big|_{\Gamma_3^S}\right]\right\rangle_{\Gamma_3^+} + \left\langle \boldsymbol{q}_{ik,1}, \mathcal{S}\left[\hat{\boldsymbol{f}}_{\mathrm{d}}\big|_{D_1\times\mathbb{S}^2}\right] + \mathcal{T}[\hat{g}_1]\right\rangle_{\Gamma_1^+}$$