Electromagnetism

configuration variables
space: primal complex
time: dual complex

source variables
space: dual complex
time: primal complex

\[ \mathbf{F}_{\alpha\beta} = \partial_{\alpha} A_{\beta} - \partial_{\beta} A_{\alpha} \]

\[ \mathbf{J}^p = \partial_{\mu} \mathbf{\hat{G}}_{\mu\nu} = J^p \]

\[ \mathbf{G}^\text{mat} = \frac{1}{2} \mathbf{\hat{\epsilon}}_{\alpha\beta} \mathbf{\hat{F}}_{\alpha\beta} \]

\[ \mathbf{G}^\mu_{\nu} = \partial_\mu \mathbf{\hat{F}}_\nu - \partial_\nu \mathbf{\hat{F}}_\mu \]

\[ \mathbf{F}^\mu = \partial_\mu \mathbf{\hat{F}}^\mu \]

\[ \mathbf{J}^\alpha = \int_H J^\alpha dH \]

\[ \mathbf{F}^\alpha_{\beta} = \int_H F^\alpha_{\beta} dH \]

\[ \mathbf{G}^\mu_{\nu} = \frac{1}{2} \mathbf{\hat{\epsilon}}_{\alpha\beta} \mathbf{\hat{F}}^\mu_{\alpha\beta} \]

\[ \mathbf{J}^\mu = \int_H J^\mu dH \]

[equiv] is the permutation symbol (\(\equiv\) Levi-Civita symbol) that is a tensor density
\(\mathbf{A}_\alpha\) associated with lines \(\rightarrow\) spin 1 particle one dimensional space-time element.
\(\mathbf{\hat{F}}_{\mu}\) exists in the regions in which \(J^\mu = 0\).


ELE6-23; http://discretemathematics.dicar.units.it