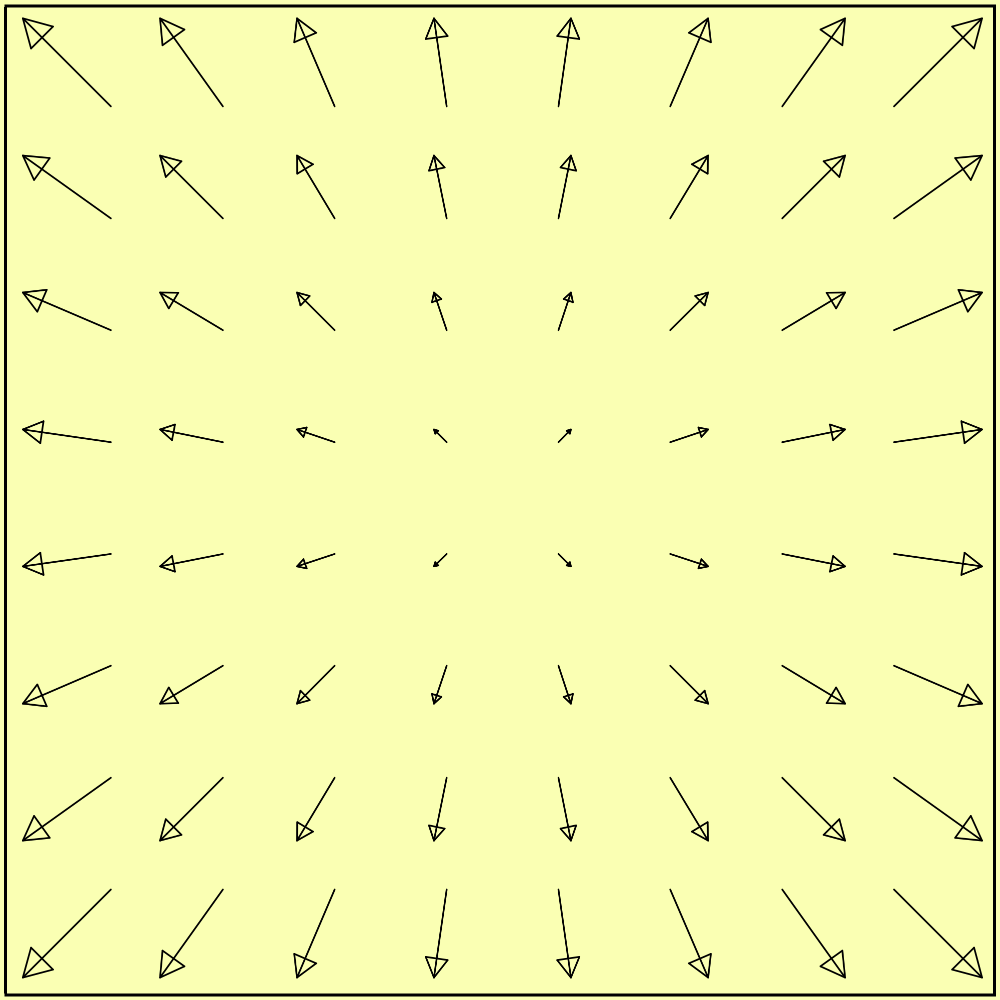
THE GEOMETRY OF DIVERGENCE

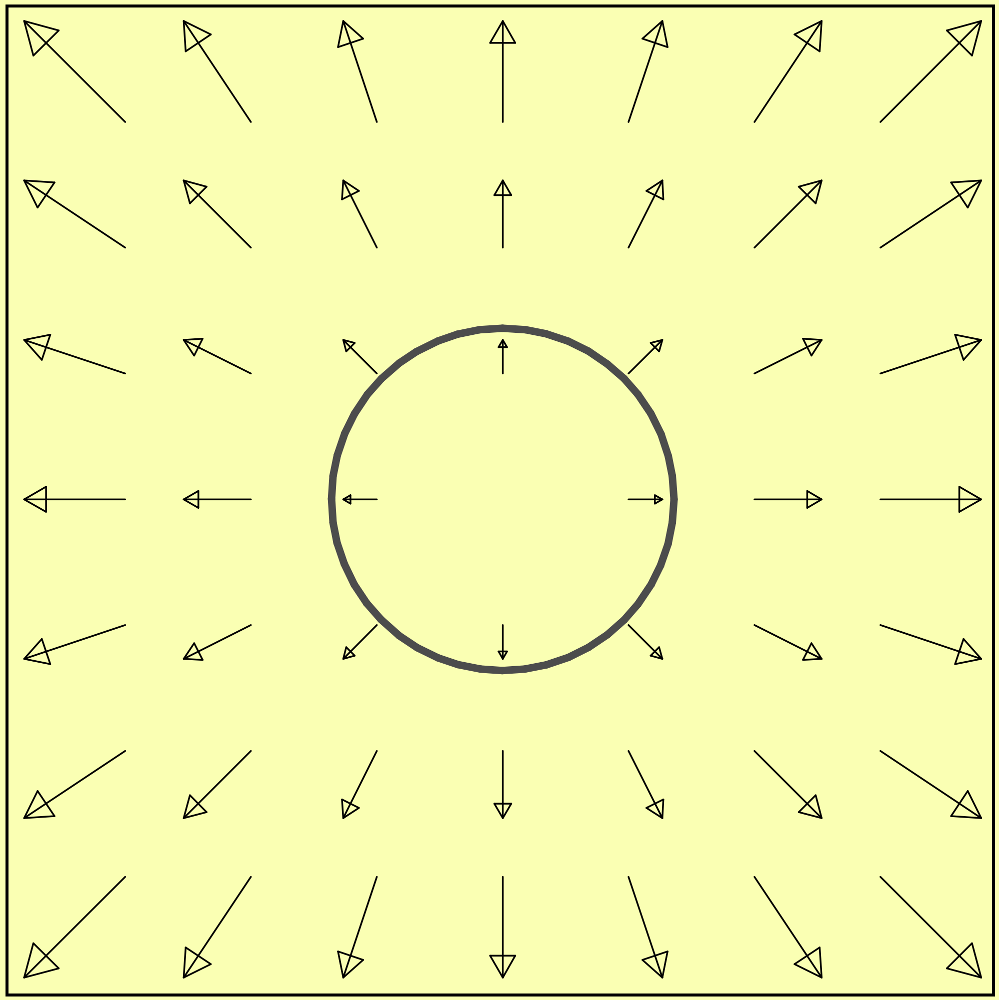
$$\int_{\text{box}} \vec{\boldsymbol{F}} \cdot d\vec{\boldsymbol{A}} = \int_{\text{inside}} \vec{\nabla} \cdot \vec{\boldsymbol{F}}\, dV$$

$$\vec{\nabla} \cdot \vec{\boldsymbol{F}} \approx \frac{\int \vec{\boldsymbol{F}} \cdot d\vec{\boldsymbol{A}}}{\text{volume of box}} = \frac{\text{flux}}{\text{unit volume}}$$

THE GEOMETRY OF DIVERGENCE



THE GEOMETRY OF DIVERGENCE



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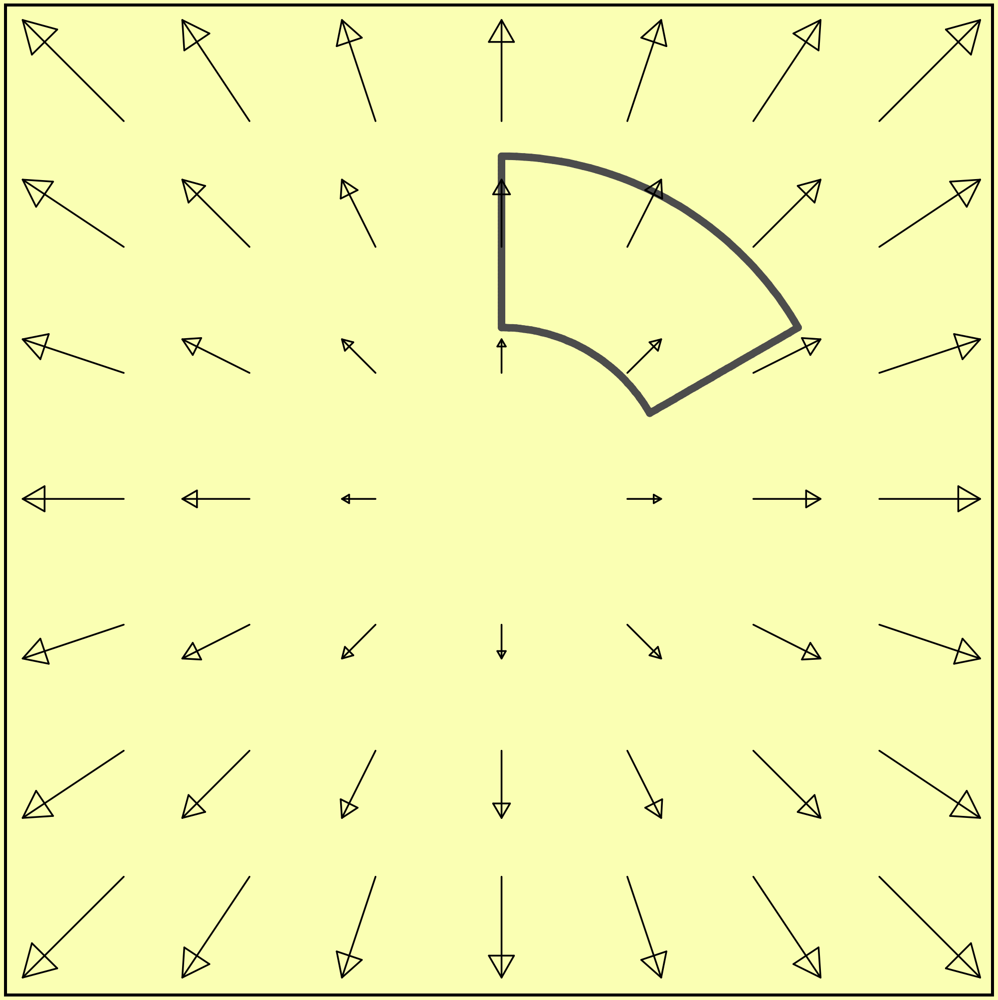

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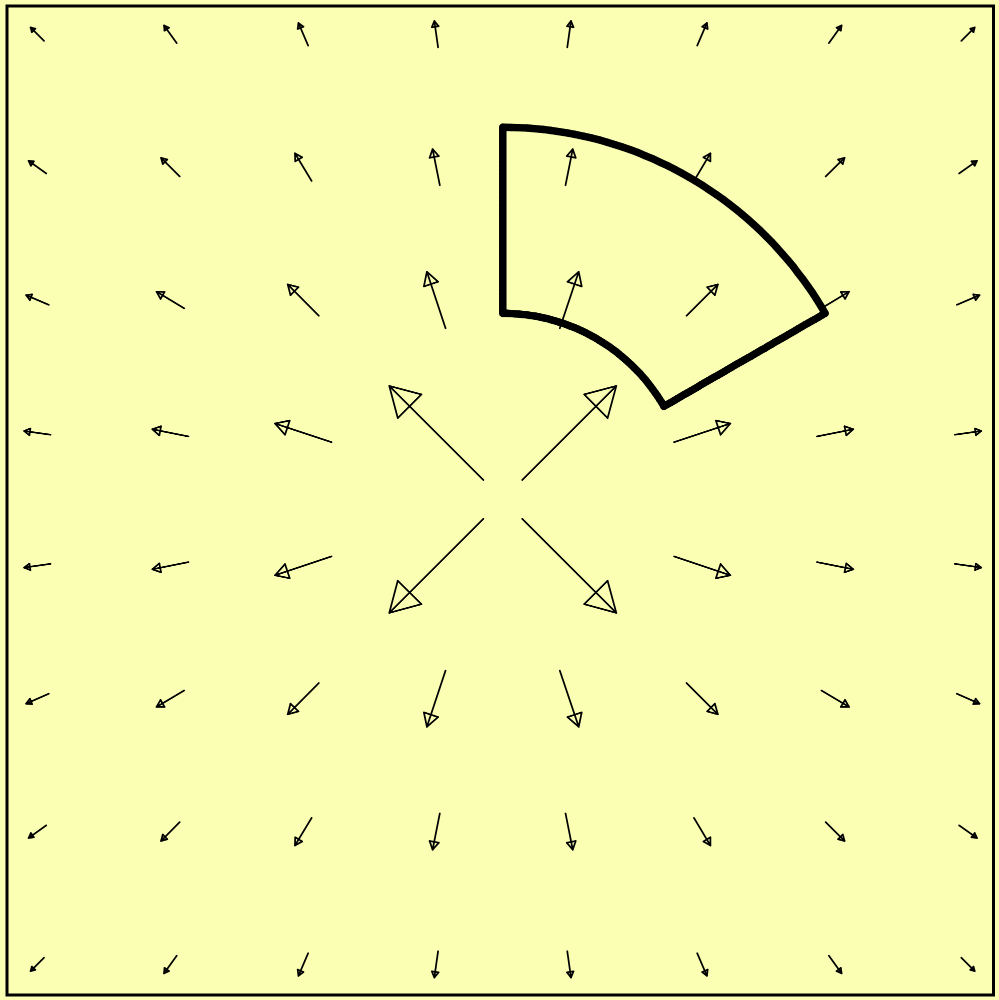
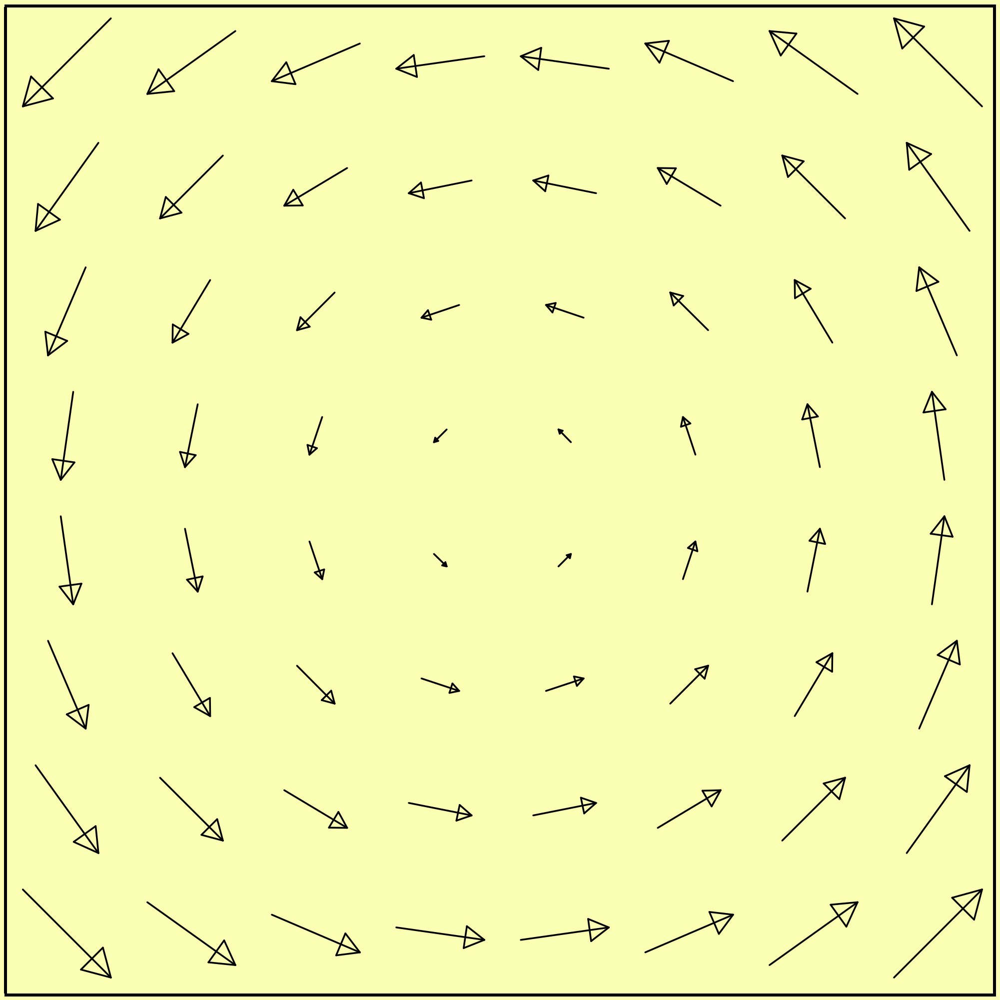


THE GEOMETRY OF CURL

$$\oint_{\text{loop}} \vec{\boldsymbol{F}} \cdot d\vec{\boldsymbol{r}} = \int_{\text{inside}} (\vec{\nabla} \times \vec{\boldsymbol{F}}) \cdot d\vec{\boldsymbol{A}}$$

$$(\vec{\nabla} \times \vec{\boldsymbol{F}}) \cdot \hat{\boldsymbol{n}} \approx \frac{\oint \vec{\boldsymbol{F}} \cdot d\vec{\boldsymbol{r}}}{\text{area of loop}} = \frac{\text{(oriented) circulation}}{\text{unit area}}$$

THE GEOMETRY OF CURL



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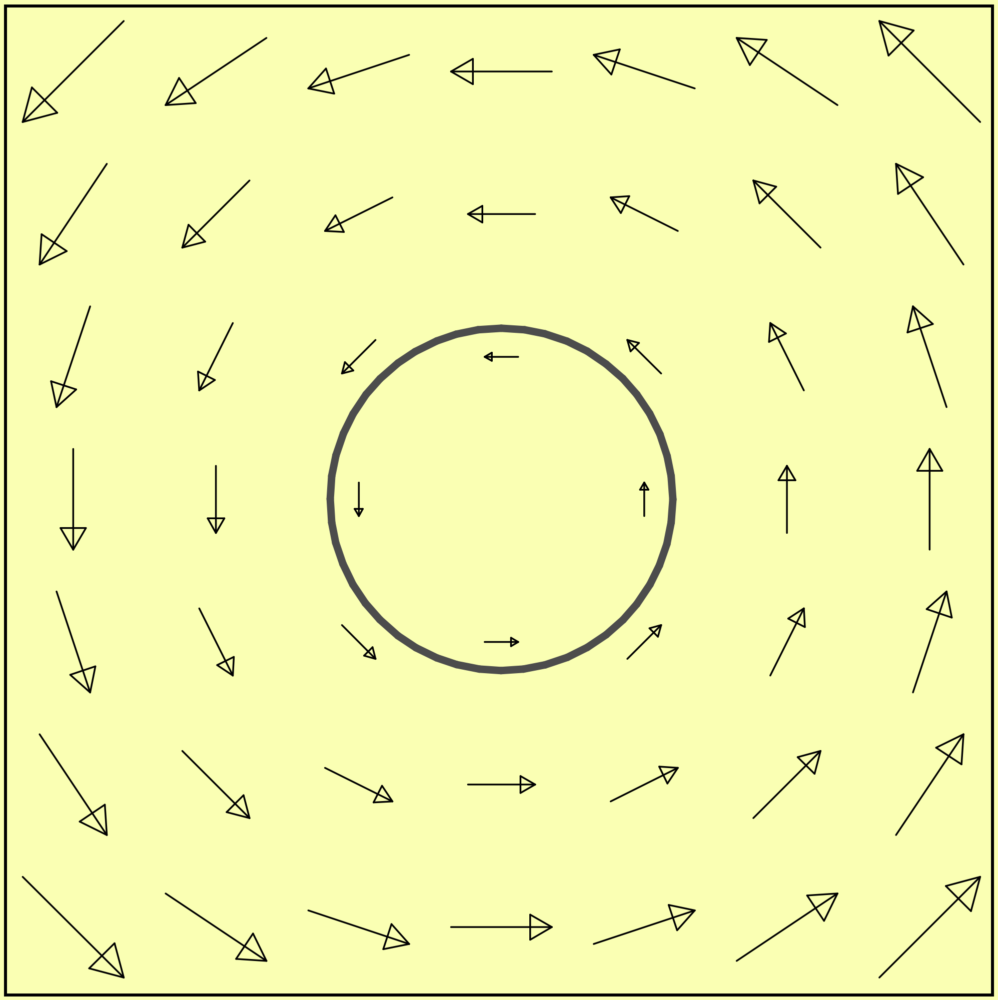

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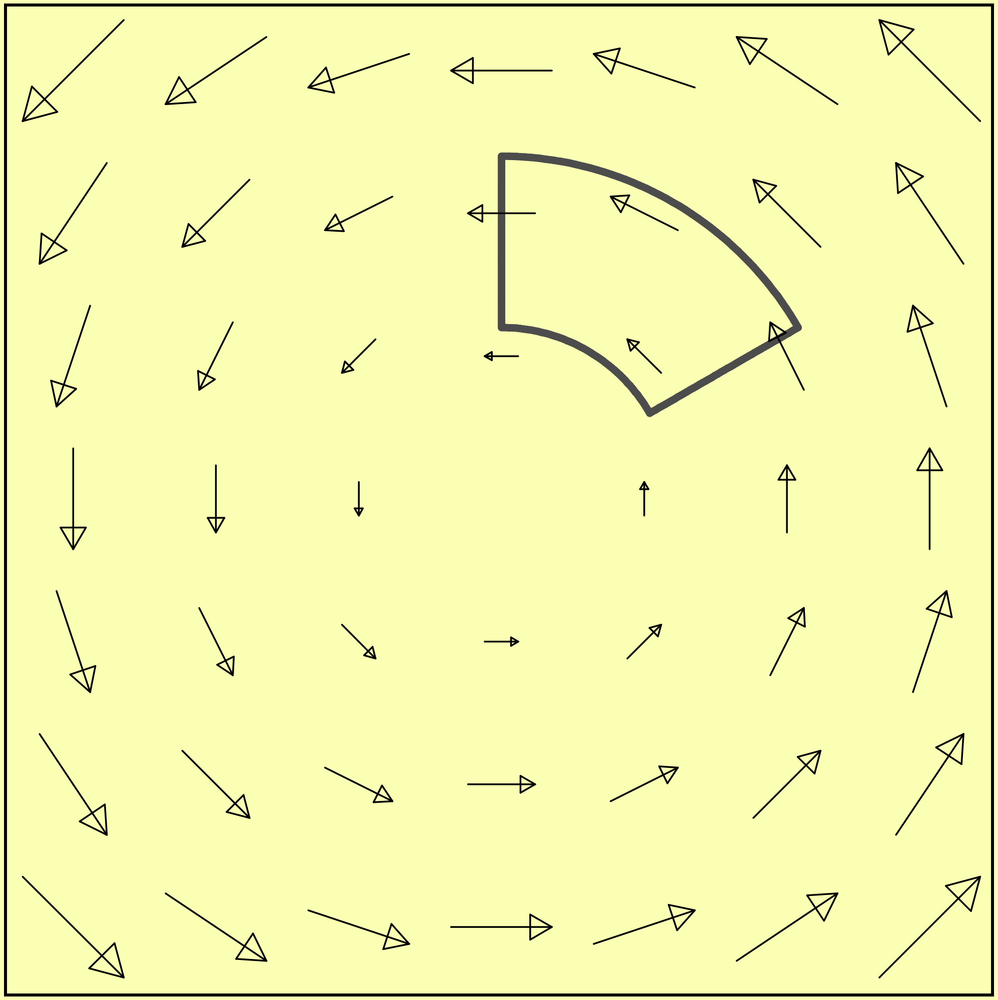

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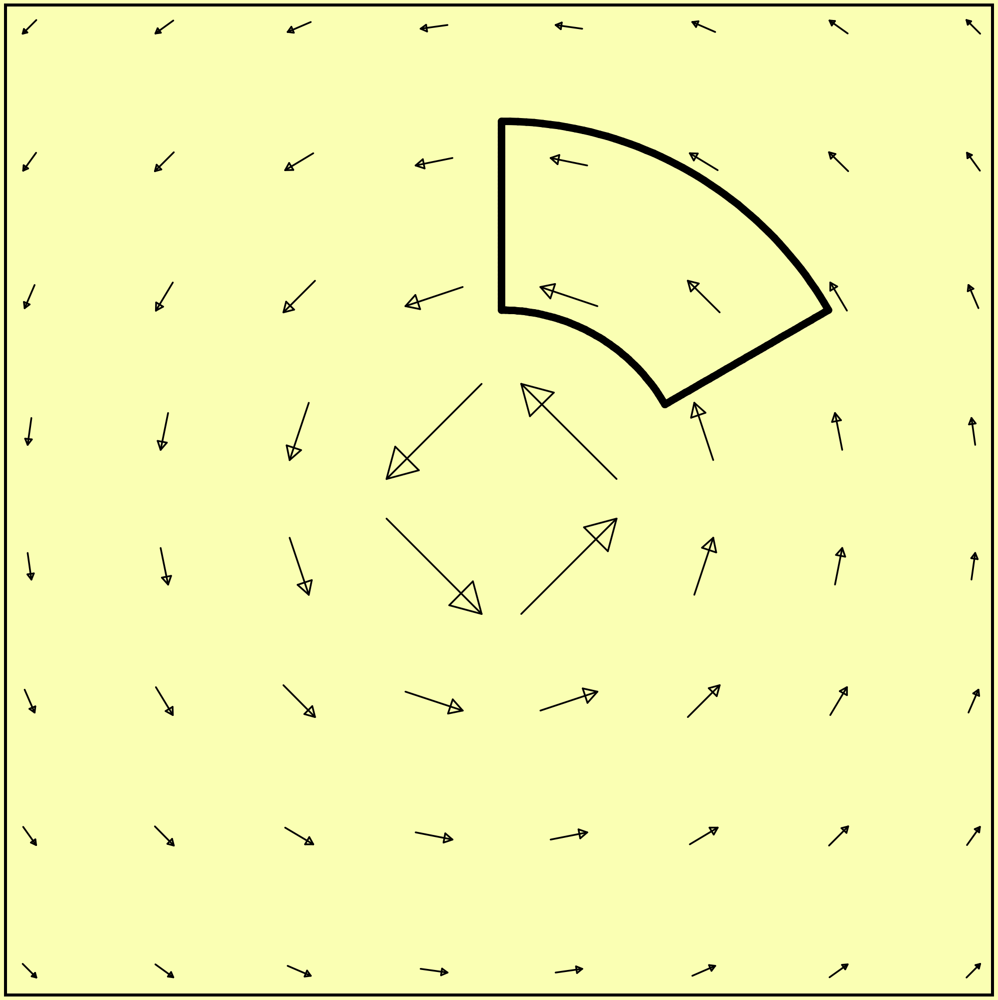


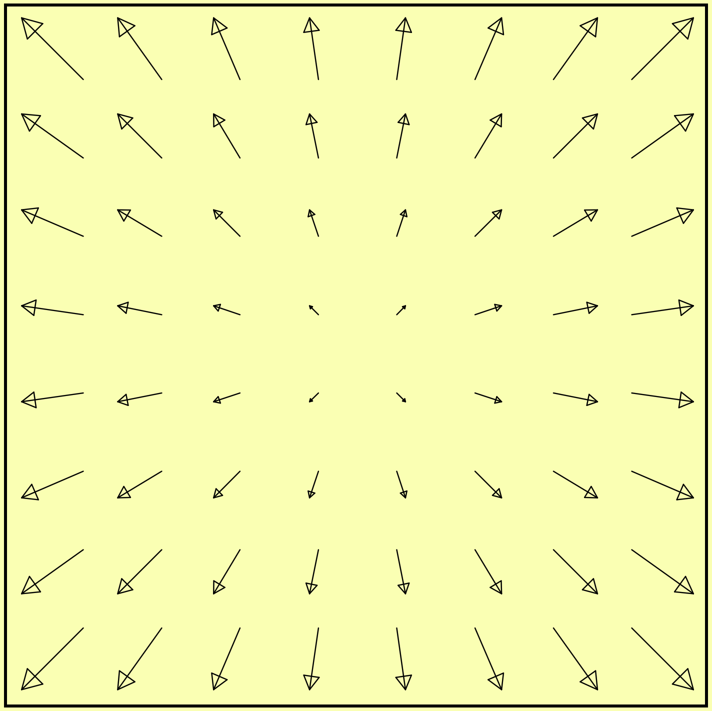
THE GEOMETRY OF CONSERVATIVE VECTOR FIELDS

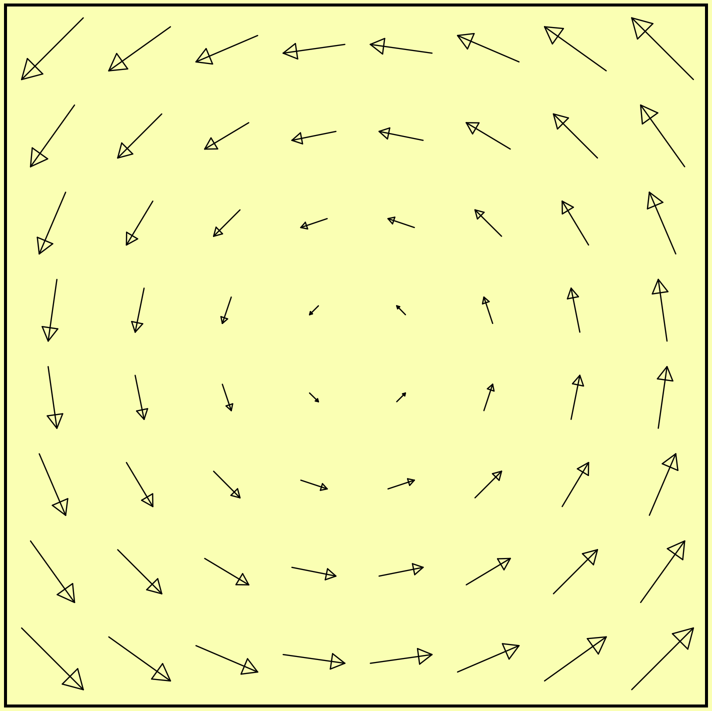
$$\boxed{\vec{\boldsymbol{F}} = \vec{\nabla} f}$$

$$\vec{\boldsymbol{F}} \cdot d\vec{\boldsymbol{r}} = \vec{\nabla} f \cdot d\vec{\boldsymbol{r}} = df$$

$$\oint \vec{\boldsymbol{F}} \cdot d\vec{\boldsymbol{r}} = 0$$

THE GEOMETRY OF CONSERVATIVE VECTOR FIELDS





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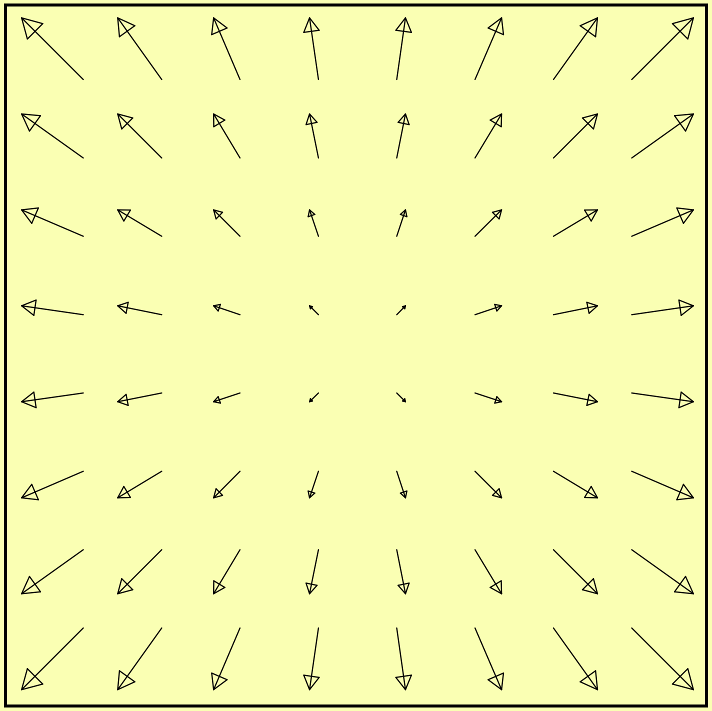

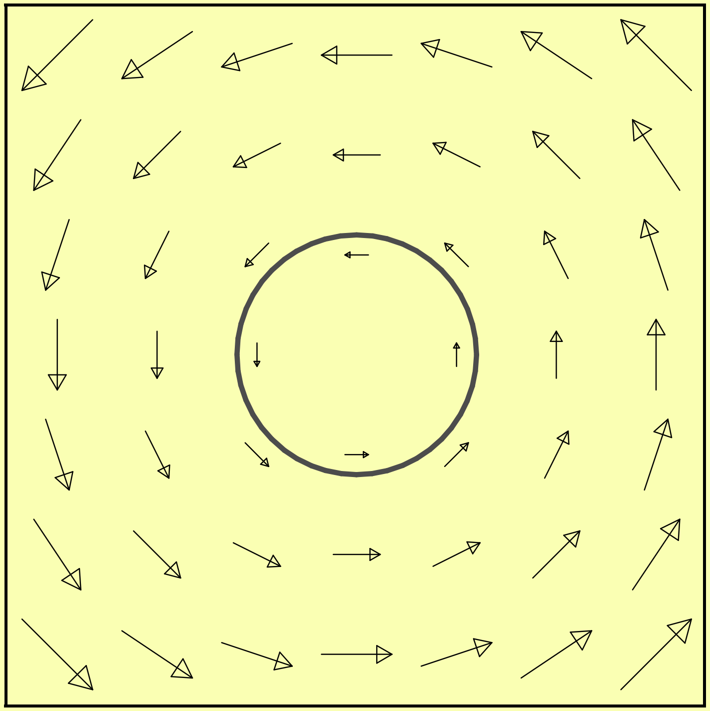

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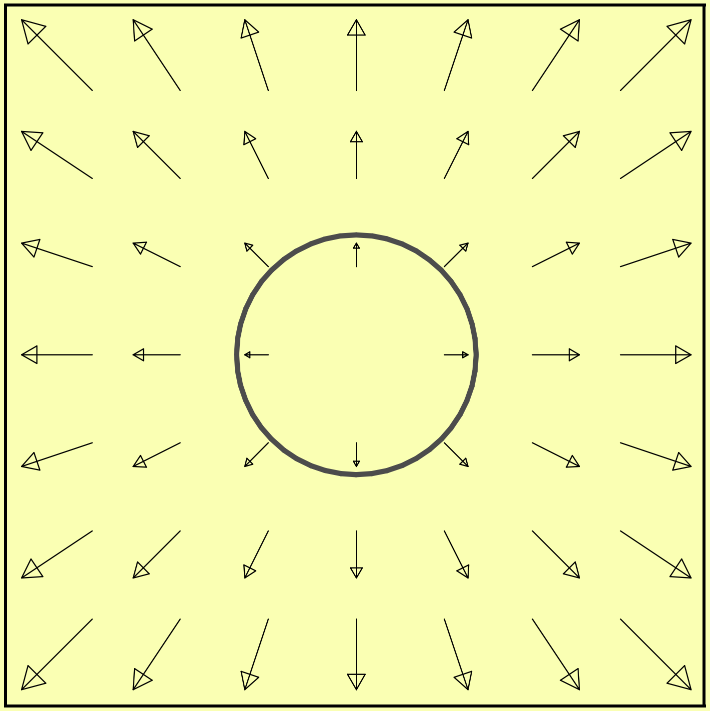

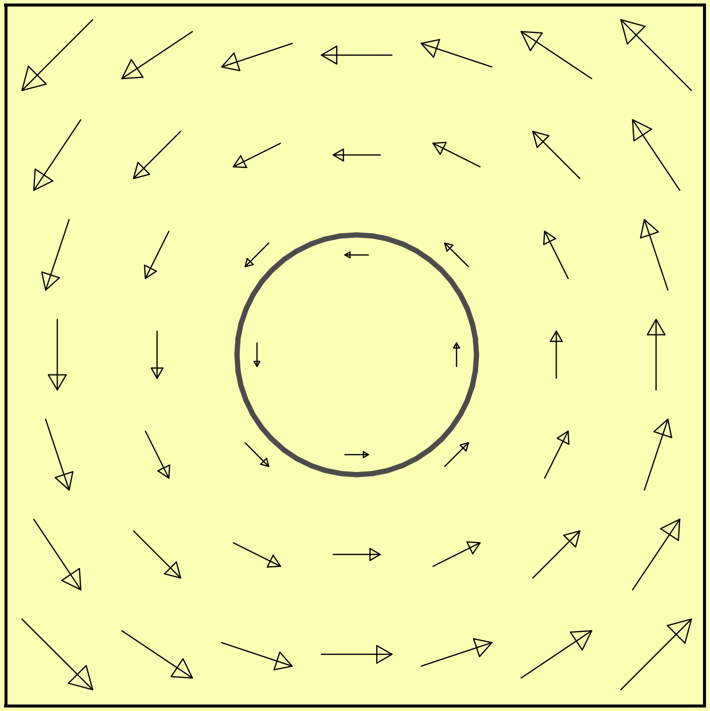

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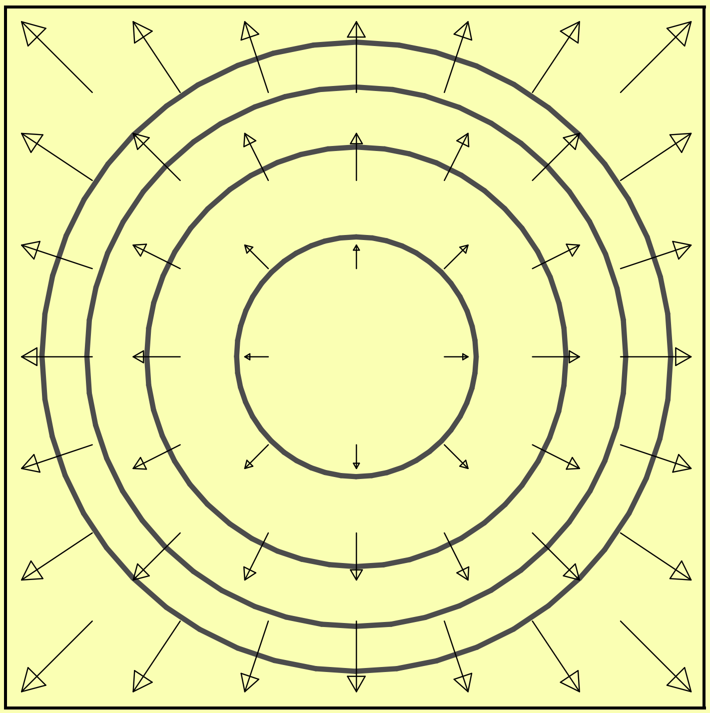

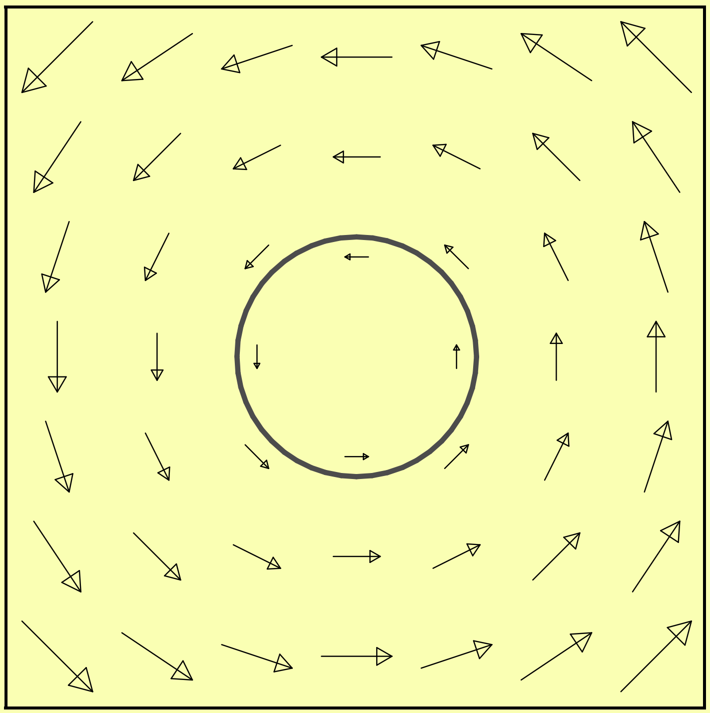

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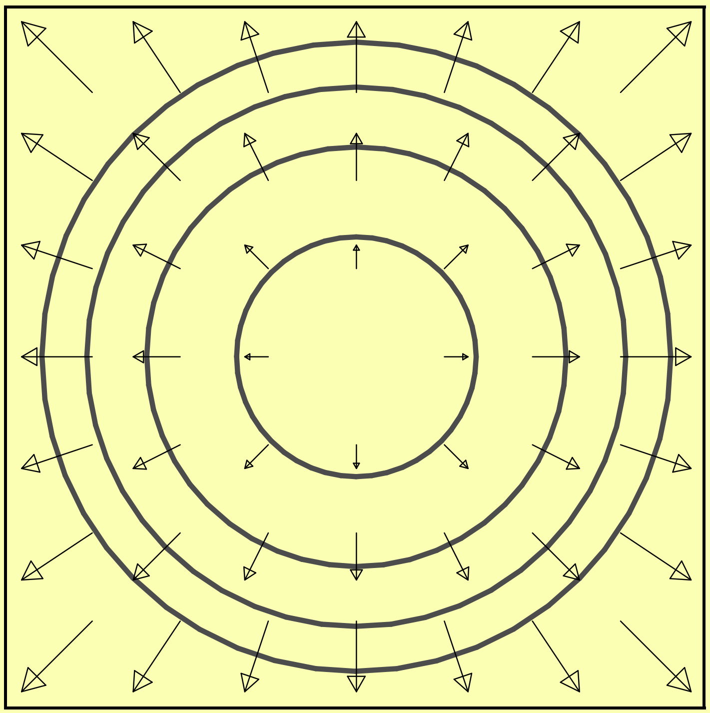

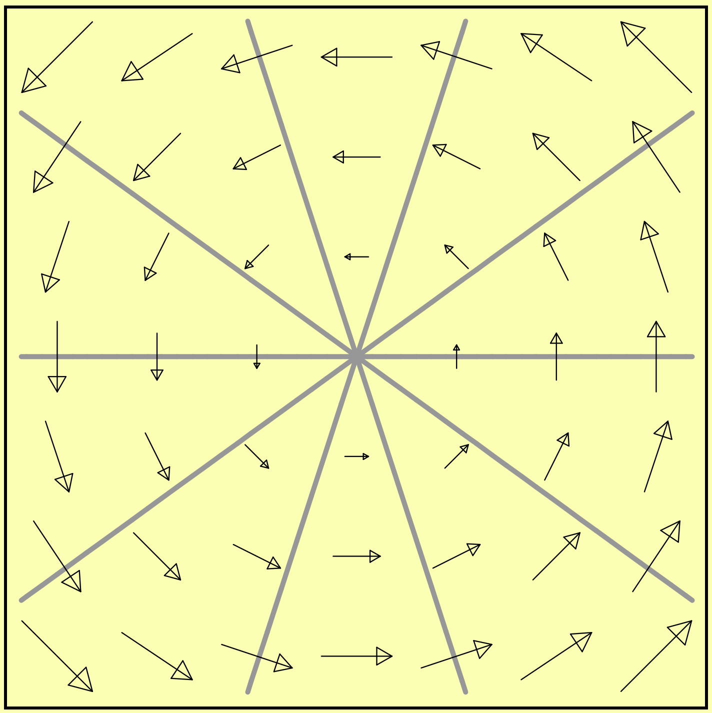

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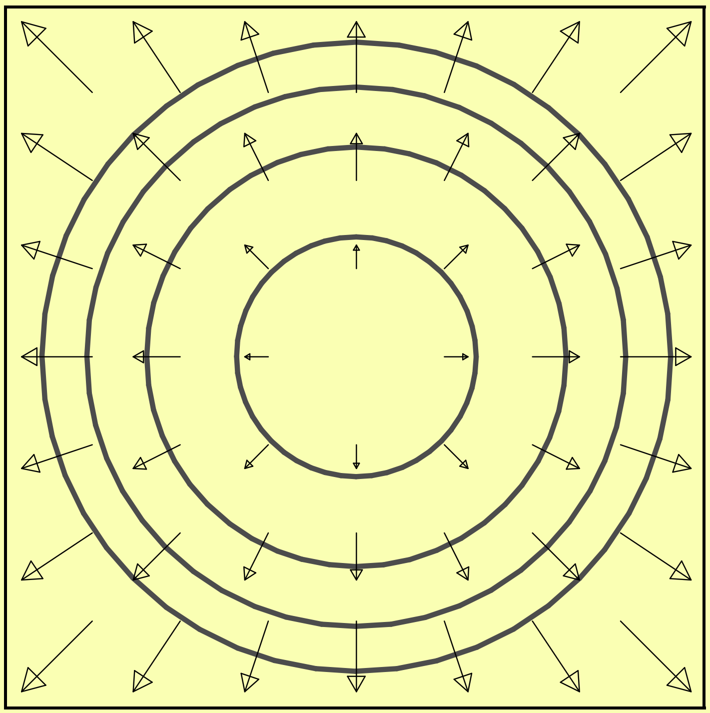

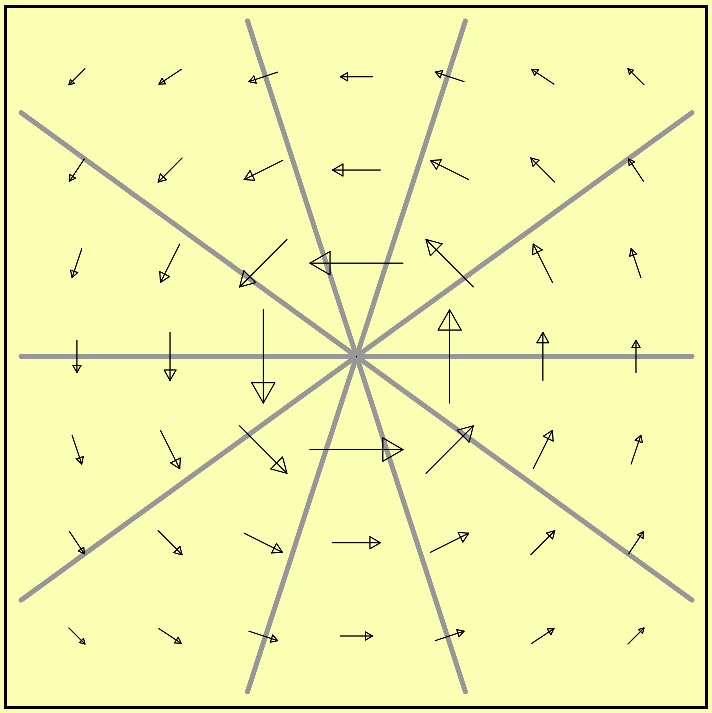

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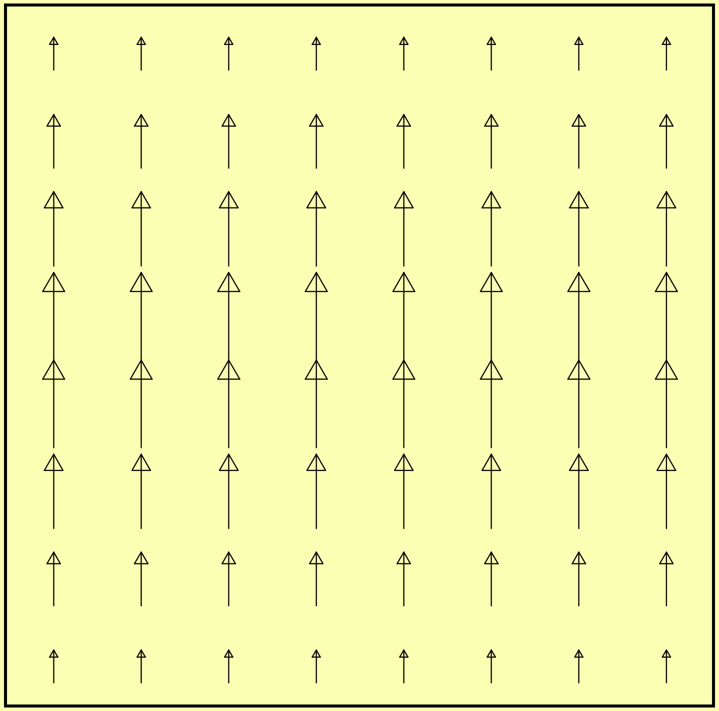

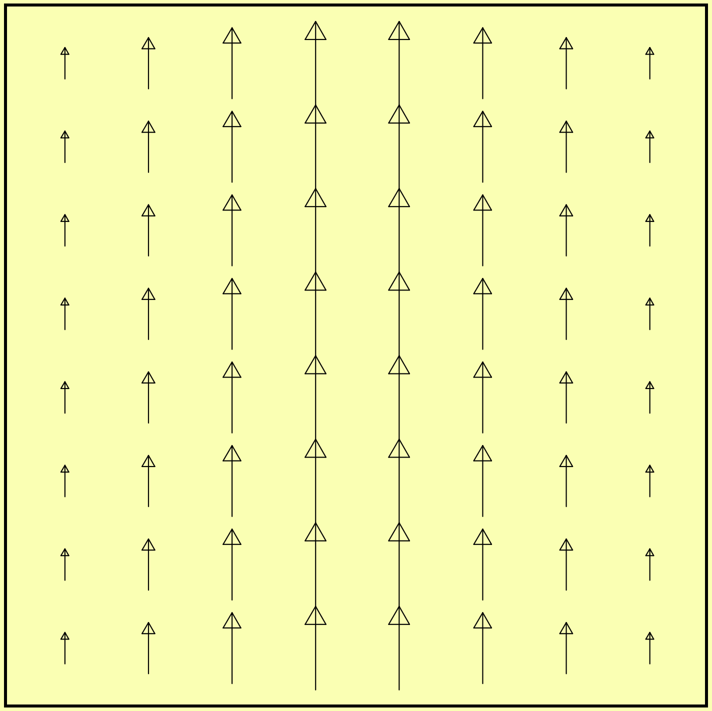

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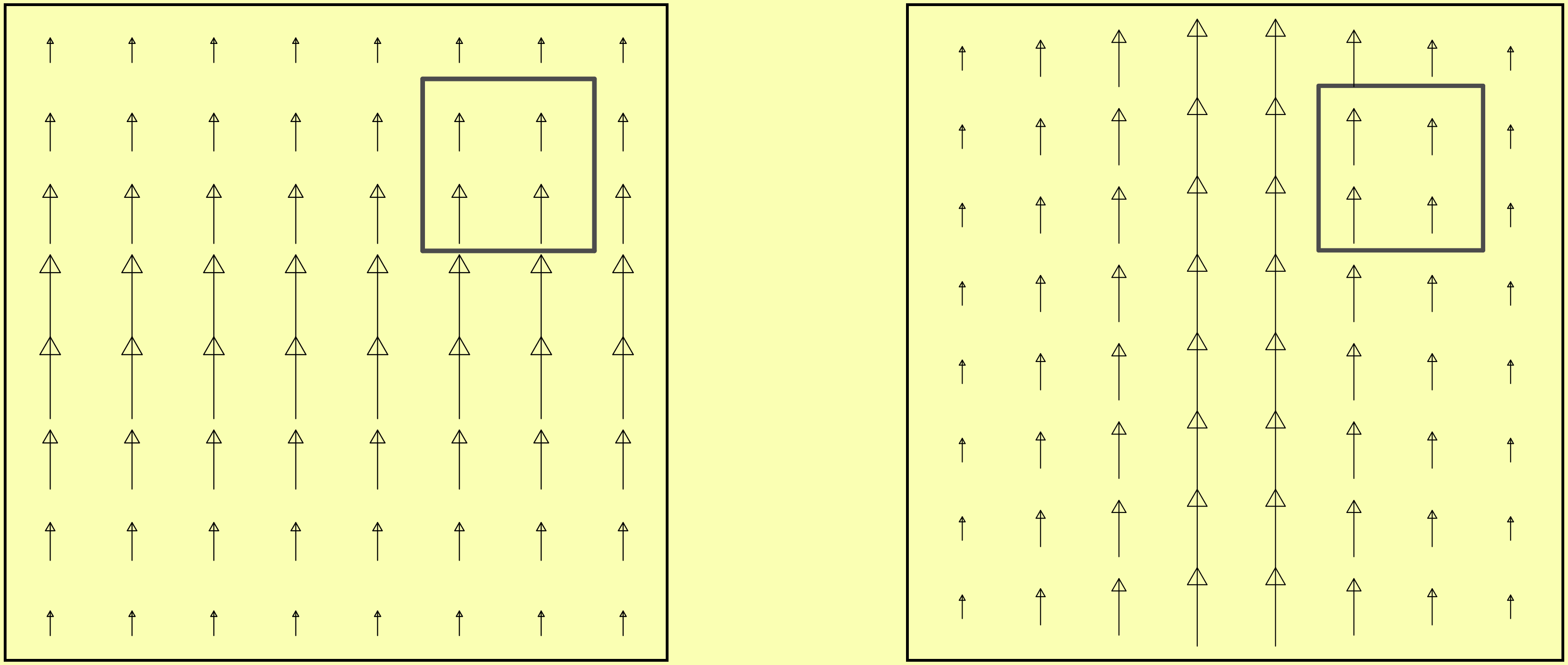

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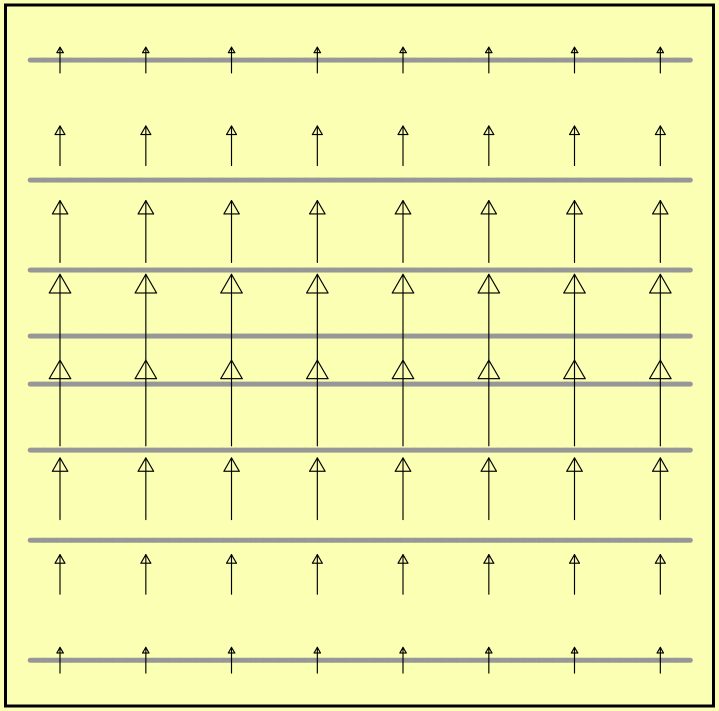

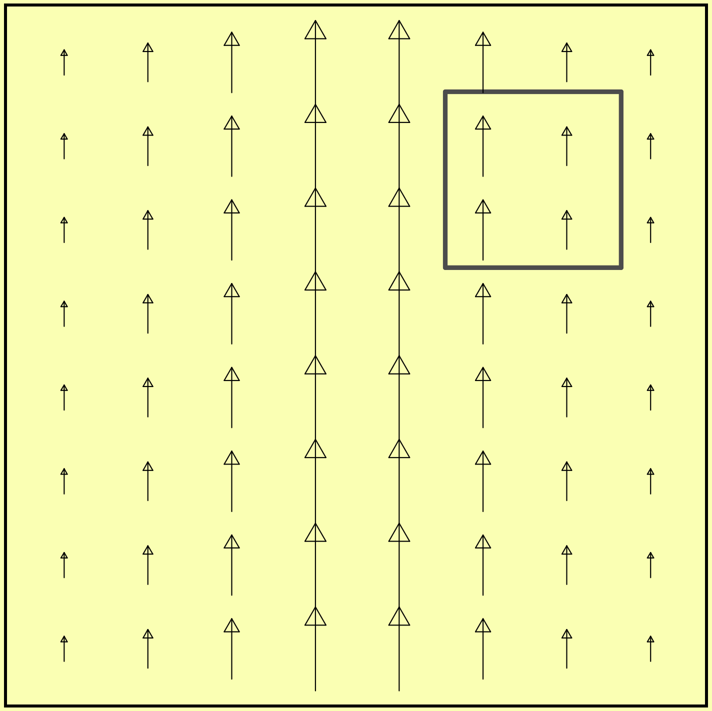

THE GEOMETRY OF CONSERVATIVE VECTOR FIELDS