

# METHOD OF LEAST SQUARES FOR A LINE

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## Problem Statement

For a velocity flow field  $\mathbf{u} = u\hat{\mathbf{i}} + v\hat{\mathbf{j}}$ , define a stream function such that

$$v = -\frac{\partial\psi}{\partial x} \quad u = \frac{\partial\psi}{\partial y} \quad (1)$$

Taking curl of the Stokes flow equations, we get

$$\nabla^2(\nabla \times \mathbf{u}) = \nabla \times \nabla p = 0 \quad (2)$$

Writing in terms of the Stream function, we see that the equation is bi-harmonic

$$\nabla^4\psi = 0 \quad (3)$$

The streamlines for a Stokeslet in infinite domain are as shown in the figure below.

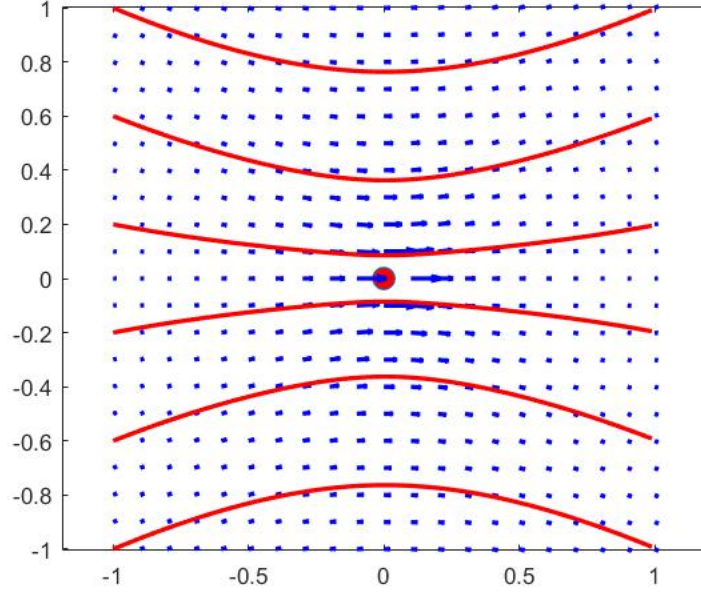


Figure 1: Flow past a Stokeslet