1 Other

1.1 Definition of vortex

page 311:
Vortex is recognized by the streamlines that resemble a helix. But that is not Galilean invariant, so maybe a *bundle of vorticity lines* is the correct topological definition.
More precisely, vortex is a *vorticity tube* surrounded by irrotational flow, but the boundary may not be clear in viscous flow,
so maybe add *threshold magnitude* $|omega_0|$. But how to calculate that threshold quantitatively?
A starting point would be to say that the vortex is defined by *flow region where the vorticity prevails over the strain rate.* [1]

2 Equations and variable definitions

$$\Pi \equiv p - (\lambda + 2\mu)\vartheta \tag{1}$$

where ϑ is the trace of the shear tensor D.

$$D = \frac{1}{2}[\nabla u + (\nabla u)^T] \quad \text{, with} \quad D_{ii} = \vartheta \tag{2}$$

so basically $\vartheta = \nabla \cdot u$. [1]
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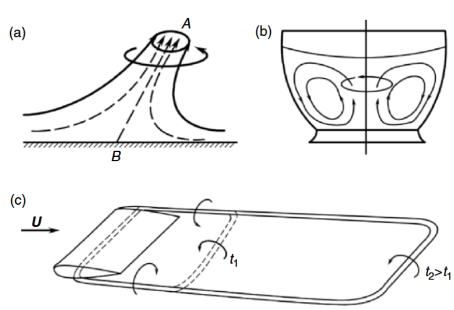
Using spheroidal coordinates, one can express the continuity equation,
the energy equation, using enthalpy,
vorticity conservation equations.
Than, introducing $\Gamma = rv$ to be the same for ω_r and ω_z as ψ is for u and w. Using those, we can come up with solutions for inviscid flow. [1]

3 Pictures

Fig.3.5 from page 74.



References

[1] Jie-Zhi Wu. *Vorticity and Vortex Dynamics.* Springer Berlin / Heidelberg, Berlin, Heidelberg, 2006.