Hollow Vortices Behind a Normal Plate

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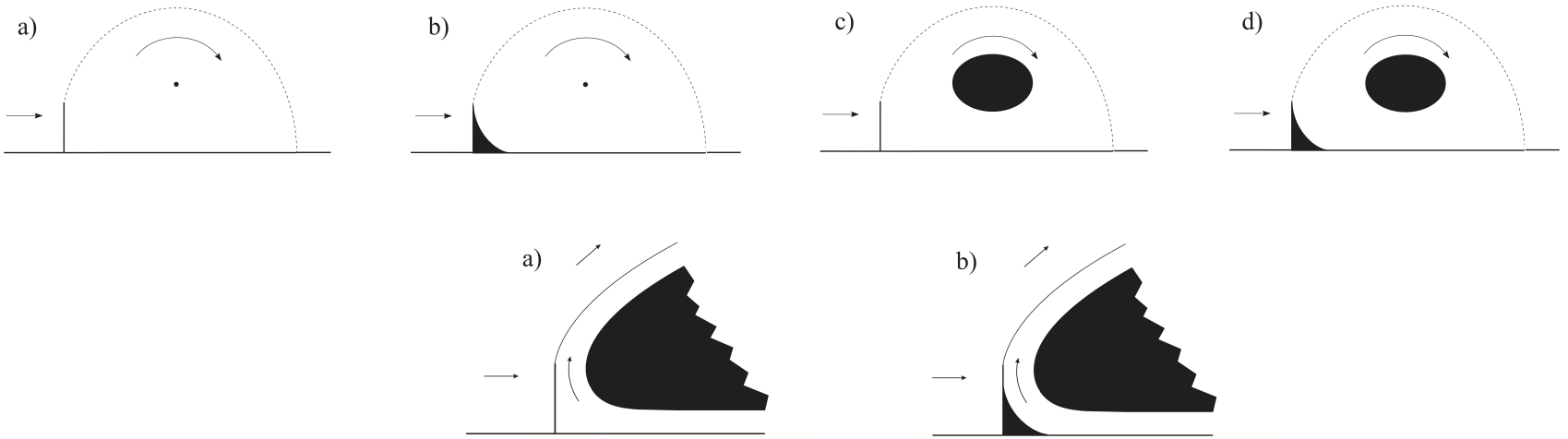
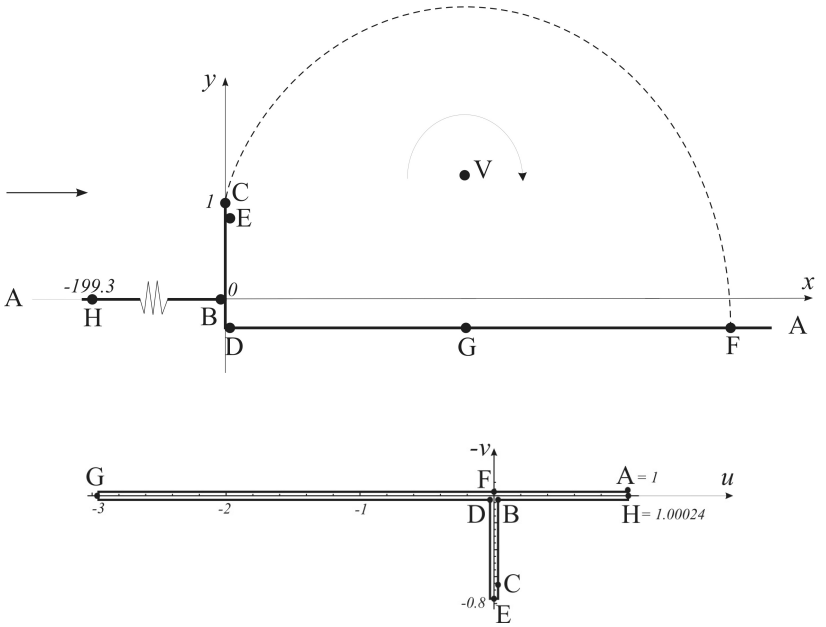
Overview



- Point vortex behind a normal plate and step
- Adding a corner hollow
- Desingularizing the point vortex
- Infinite hollows without and with corner hollows

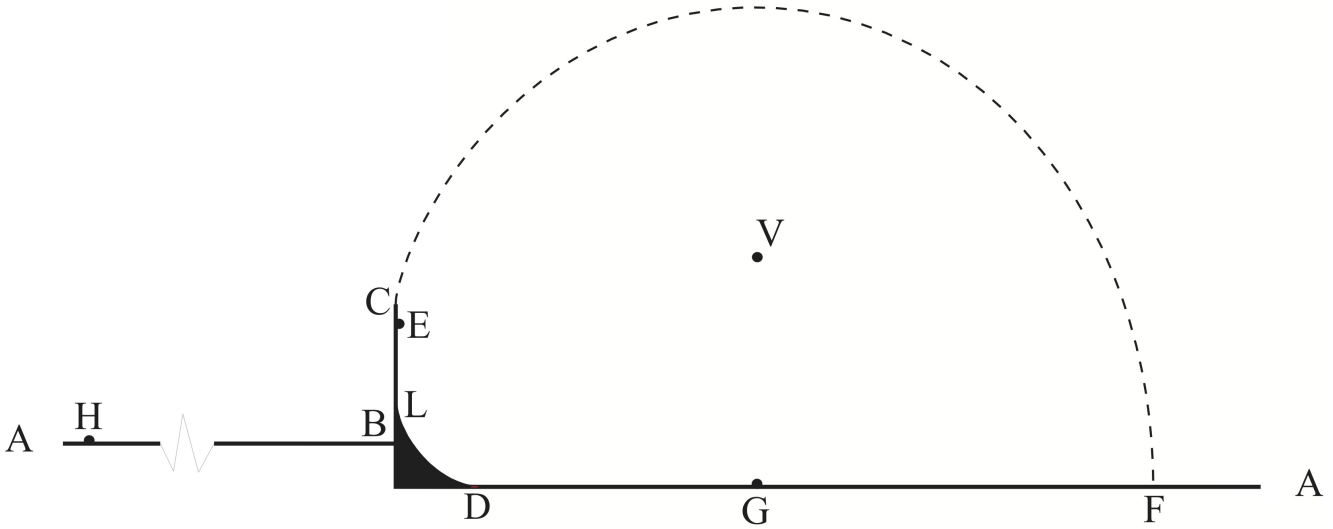
Point Vortex

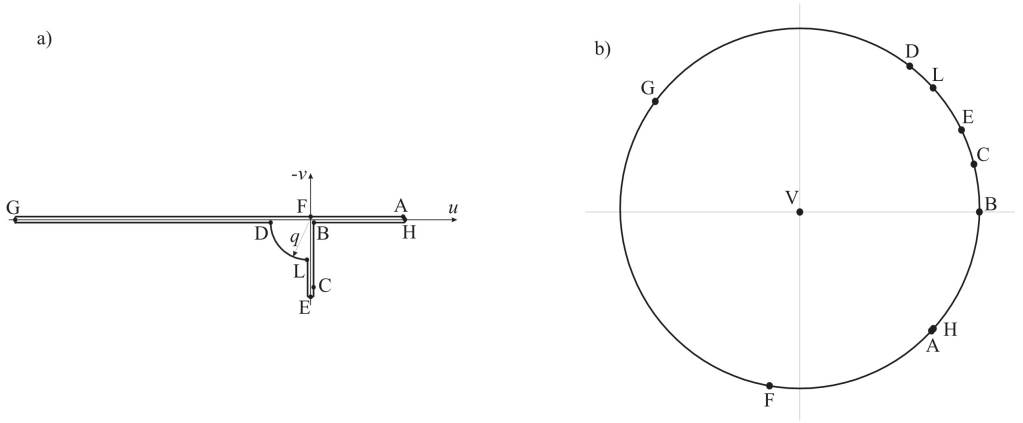


Hodograph method

$$\frac{dz}{d\lambda} = \frac{dw/d\lambda}{dw/dz},$$

BD can not be made to go to zero! V is at ∞ in the λ plane.

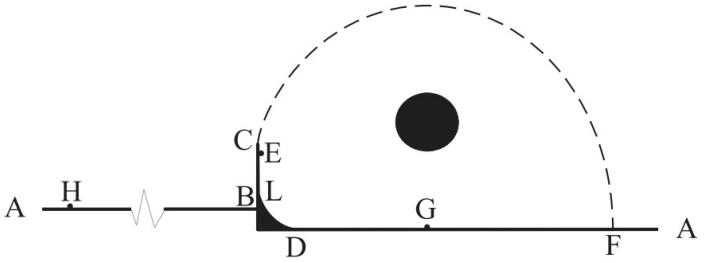


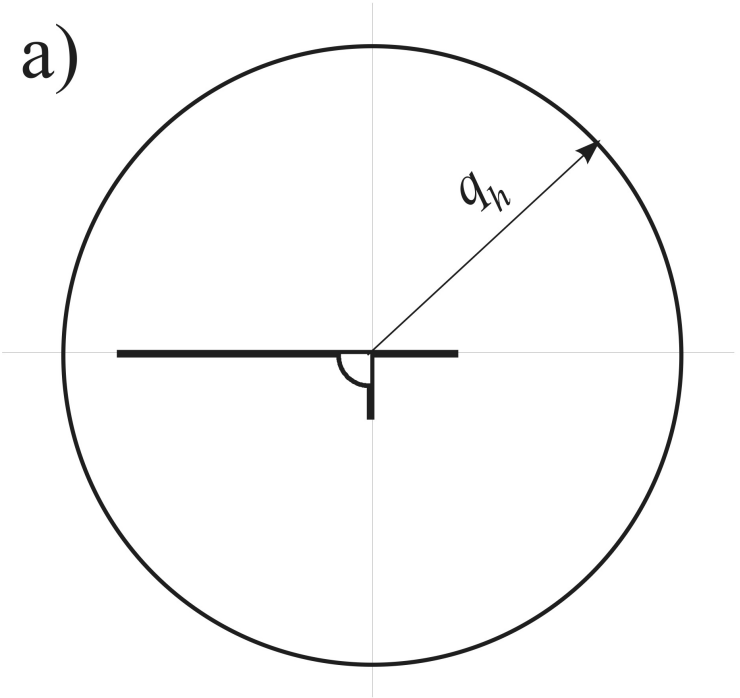


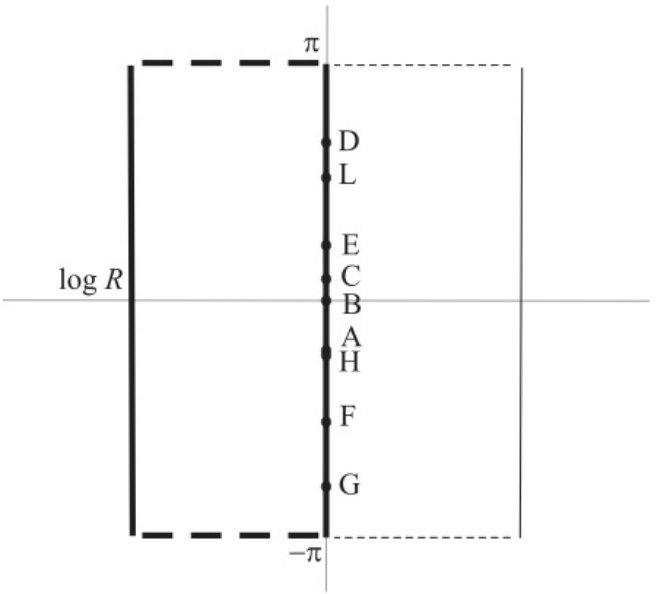
Note velocity maxima at E and G.

SCTOOLBOX, polygonal approximation of circular arc.
Again step does not approach zero

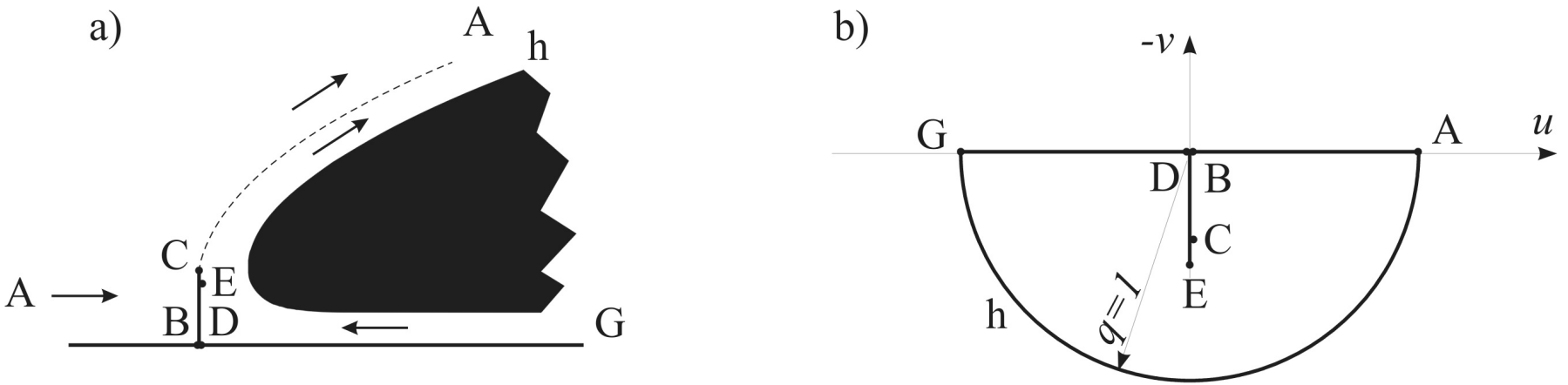
Corner plus Hollow



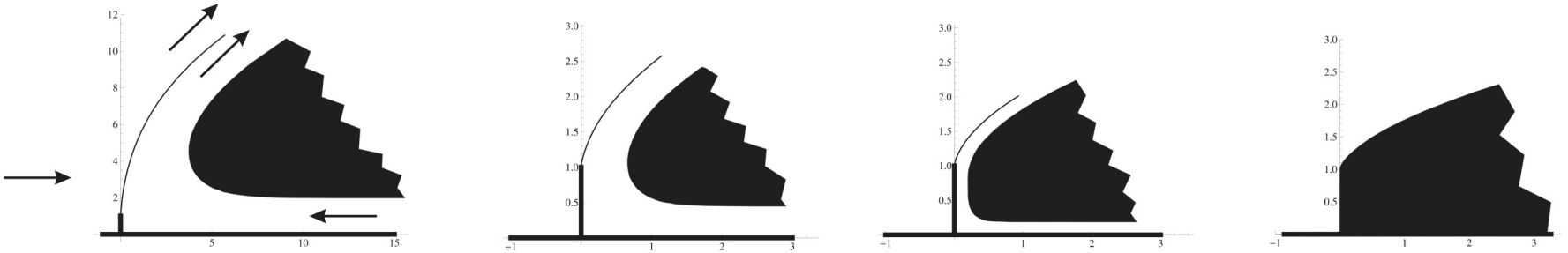




$$\oint_{|\lambda|=R} \frac{dz}{d\lambda}\, d\lambda = 0$$



Open hollow wake without corner separation: a) physical plane; b) hodograph plane.



Infinite hollow vortices and their limiting cases.

Adding a corner hollow