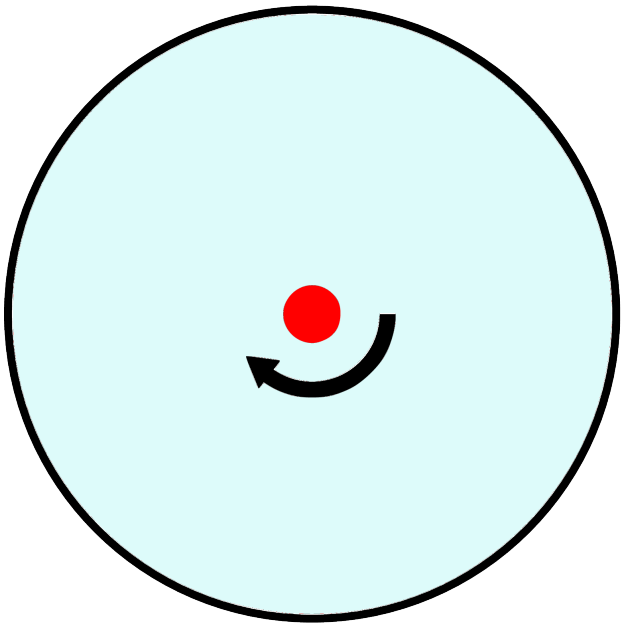
# Vortices in Superfluid

## Part A. Steady filament (0.75 points)

**A.1** (0.25 pt)

$v =$



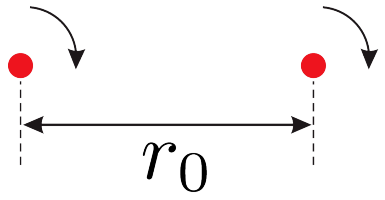
**A.2** (0.5 pt)

$z(r) =$

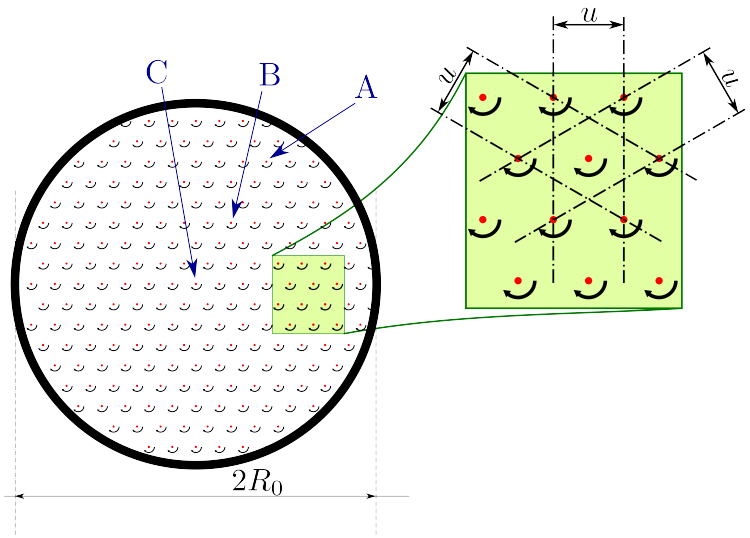
## Part B. Vortex motion (1.25 points)

**B.1** (0.25 pt)

$v_0 =$




**B.2** (0.15 pt)




**B.3** (0.4 pt)

$v\,(\vec{r}) =$

**B.4** (0.2 pt)

$AB(t) =$

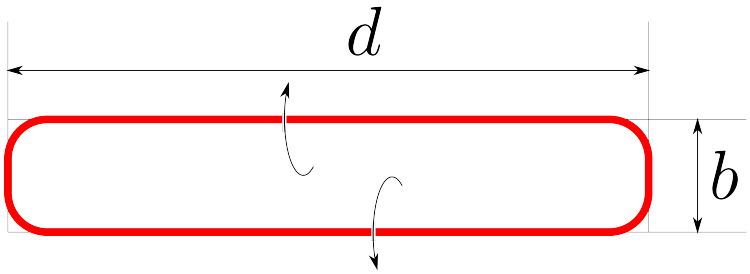
**B.5** (0.25 pt)

$z\,(\vec{r}) =$

## Part C. Momentum and Energy (1.75 points)

**C.1** (0.3 pt)

$\left|\vec{P}\right| =$

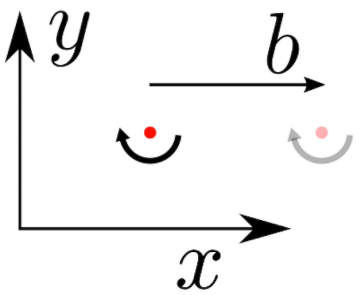



**C.2** (0.7 pt)

$U =$

**C.3** (0.75 pt)

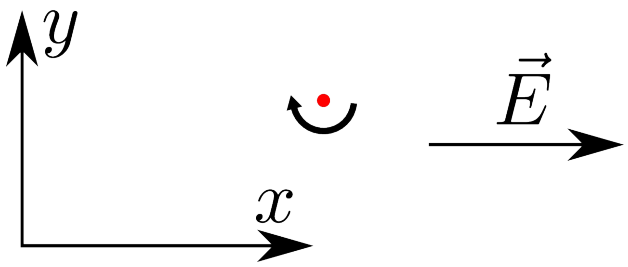
$\left|\Delta\vec{P}\right| =$



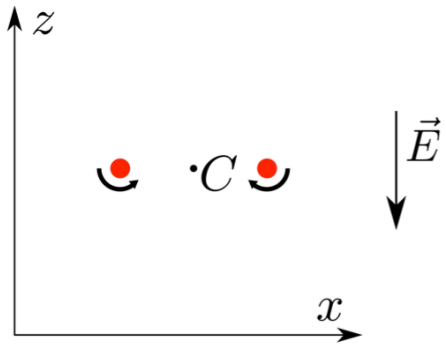
## Part D. Trapped charges (2.5 points)

**D.1** (0.5 pt)

$v(t) =$




**D.2** (0.25 pt)




**D.3** (1,5 pt)

$v(t) =$

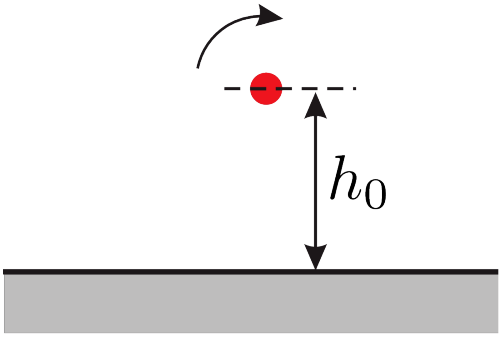
**D.4** (0.25 pt)

$v(t) =$

## Part E. Influence of the boundaries (2.75 points)

**E.1** (0.5 pt)

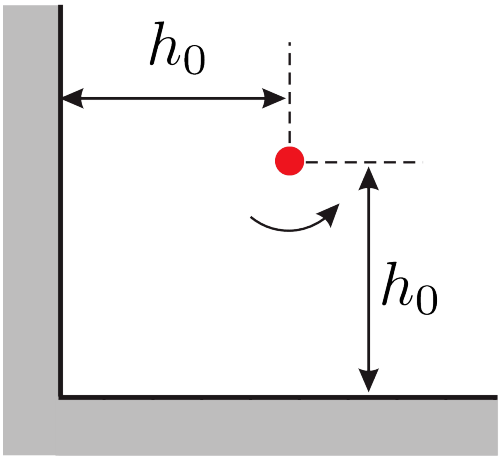
$v(t) =$




**E.2** (0.75 pt)

$v_0 =$

**E.3** (0.5 pt)



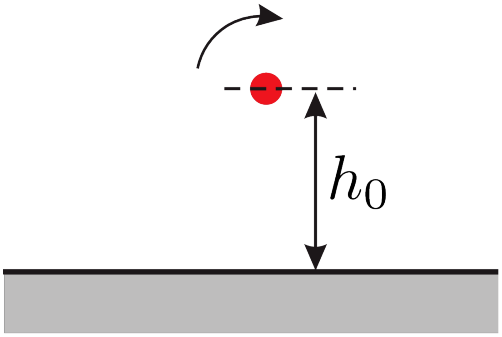

**E.4** (1 pt)

$v_\infty =$

## Part F. Charges + Walls (1 point)

**F.1** (0.5 pt)

$v(t) =$




**F.2** (0.5 pt)

$v(t) =$