机器人lab1

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Q1

x, y location

u, v vector diagram vector

theta car direction

x(k), y(k) car position at time k

V car’s velocity

x(k)=V\*cos(theta(k))\* T+x(k-1); % calculating x

y(k)=V\*sin(theta(k))\* T+y(k-1); % calculating y

Uniform

Q1.1:

u=c, v=0, c is a constant

theta=0

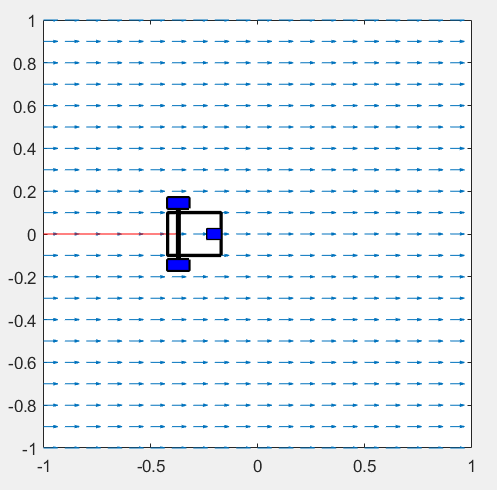
Q1.2

[draw\_x, draw\_y]=meshgrid(-1:.1:1, -1:.1:1);

draw\_u=ones(21, 21);draw\_v=zeros(21, 21);

quiver(draw\_x, draw\_y, draw\_u, draw\_v, 0.5);

hold on

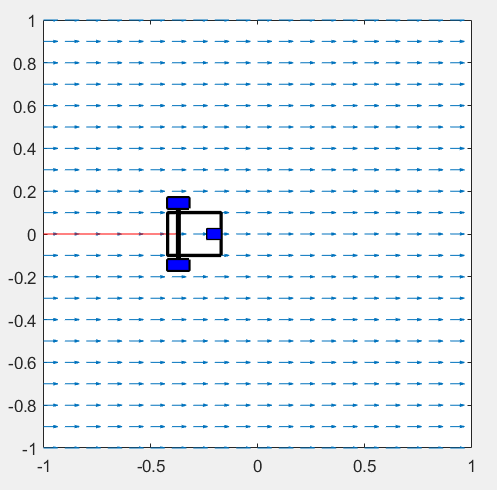


Q1.3

V=0.5;

theta(1)=0;

theta(k)=theta(k-1); % calculating theta



perpendicular

Q1.1

u=0, v=c, c is a constant

theta=pi/2

Q1.2

[draw\_x, draw\_y]=meshgrid(-1:.1:1, -1:.1:1);

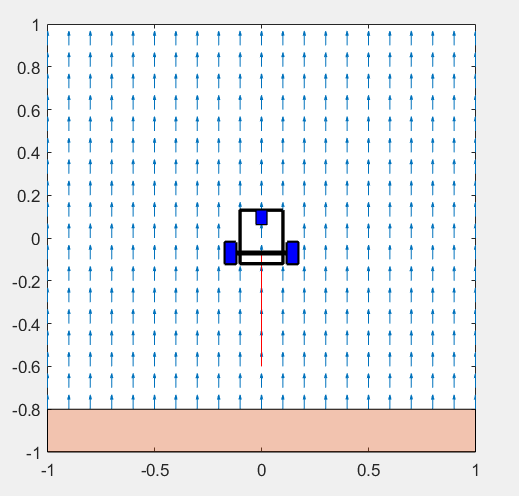
draw\_u=-draw\_x;draw\_v=-draw\_y;

quiver(draw\_x, draw\_y, draw\_u, draw\_v, 0.5);

hold on

plot(polyshape([-1 -1 1 1],[-1 -0.8 -0.8 -1]))

hold on

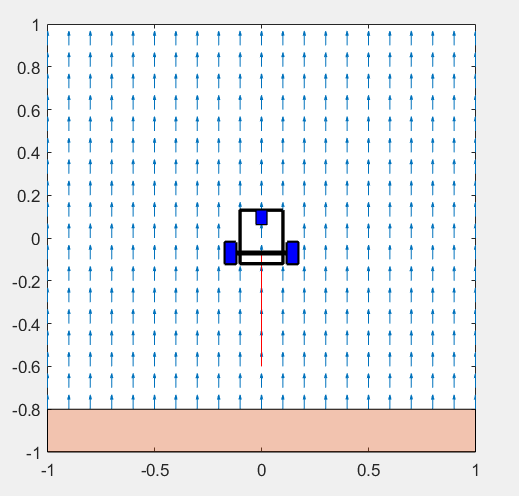


Q1.3

V=0.5;

theta(2)=pi/2; % initilize the state theta

theta(k)=theta(k-1); % calculating theta



attractive

Q1.1

u=-x; v=-y

// increase with distance to center

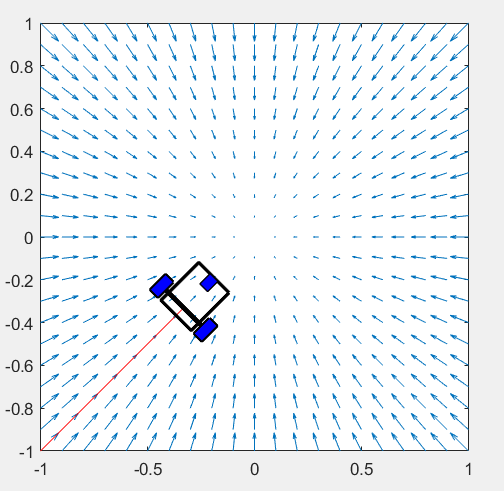
Q1.2

[draw\_x, draw\_y]=meshgrid(-1:.1:1, -1:.1:1);

draw\_u=-draw\_x;draw\_v=-draw\_y;

quiver(draw\_x, draw\_y, draw\_u, draw\_v);

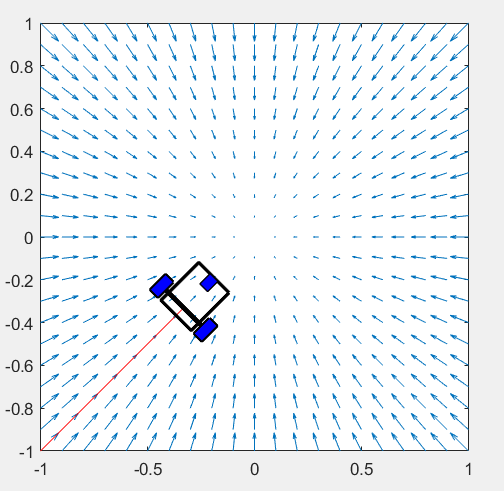
hold on



Q1.3

V=(x(k-1)^2+y(k-1)^2)^0.5;W=1;

theta(k)=atan(y(k)/x(k))+pi/2\*(sign(x(k))+1); % calculating theta



repulse

Q1.1

u=x, v=y

% calculating theta

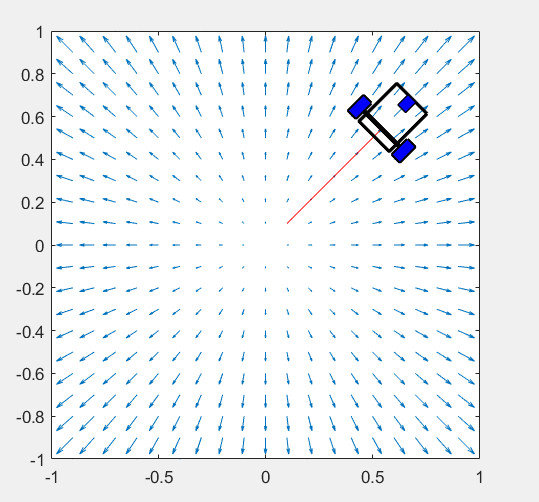
Q1.2

[draw\_x, draw\_y]=meshgrid(-1:.1:1, -1:.1:1);

draw\_u=draw\_x;draw\_v=draw\_y;

quiver(draw\_x, draw\_y, draw\_u, draw\_v);

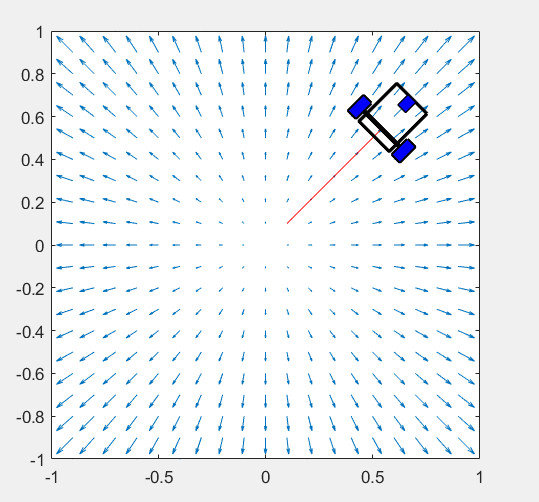
hold on



Q1.3

V=(x(k-1)^2+y(k-1)^2)^0.5;

theta(k)=atan(y(k)/x(k))+pi/2\*(sign(x(k))-1); % calculating theta



tangential

Q1.1

We set the center of circle with (0, 0.5)

Considering

Then

So we have u=0.5-y, v=x

theta(k)=W\*T + theta(k-1);

W is the angular velocity

We assume the circle radius is 0.5, so we set and W=1(a constant)

So this could be uniform circular motion

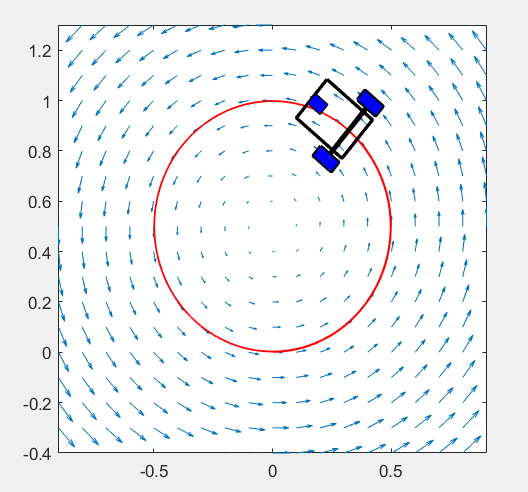
Q1.2

[draw\_x, draw\_y]=meshgrid(-1:.1:1, -.5:.1:1.5);

draw\_u=.5-draw\_y;draw\_v=draw\_x;

draw\_u=draw\_x;draw\_v=draw\_y;

quiver(draw\_x, draw\_y, draw\_u, draw\_v);



Q1.3

theta(k)=W\*T+theta(k-1); % calculating theta

V=(x(k)^2+(y(k)-0.5)^2)^0.5;

