机器人Exercise02

Task 1

calculateWheelSpeeds.m 的 TODO 部分程序：

```matlab
% -----------------------------
% ex_2_1
% In exercise2-assignment.pdf
% v is vu here
% w is omega here
% r is wheelRadius here
% l is halfWheelbase here
% /Phi(l) and /Phi(r) are LeftWheelVelocity and RightWheelVelocity here
% -----------------------------

LeftWheelVelocity = (vu - halfWheelbase * omega) / wheelRadius;
RightWheelVelocity = (vu + halfWheelbase * omega) / wheelRadius;
```
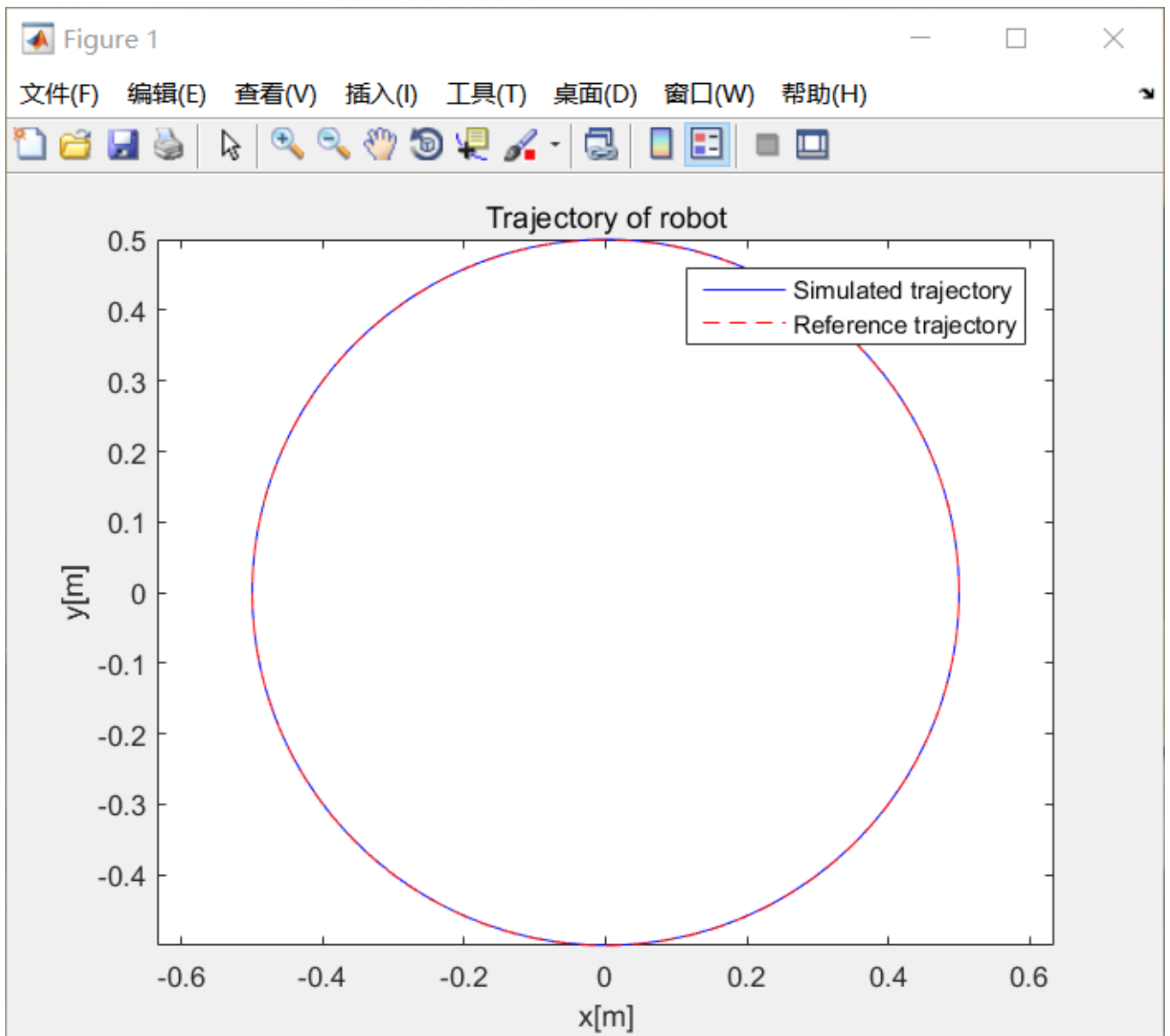
Task 2

calculateControlOutput.m 中增加的程序：

```
1.    % exercise2-assignment.pdf 中的 beta
2.    beta = - (lambda + thetag);
3.    beta = normalizeAngle(beta);
4.    ...
5.    % ---------------------------
6.    % ex_2_2
7.    % exercise2-assignment.pdf 中的公式 (3) (4)
8.    % ---------------------------
```

```
9.    vu = parameters.Krho * rho;% [m/s]
10.   omega = parameters.Kalpha * alpha + parameters.Kbeta * beta;% [rad/s]
```


Task 3

normalizeAngle.m:

```
1.    %normalizeAngle    set angle to the range [-pi,pi)
2.    function [angle1] = normalizeAngle(angle)
3.          angle1 = mod( angle+pi, 2*pi) - pi;
```

calculateControlOutput.m:

```
1.    toward = 1; %正向为1, 反向为-1
2.    if parameters.backwardAllowed
3.        % 如果是反向
4.        if abs(alpha) > pi() / 2
5.            % 转方向到 backward
6.            alpha = normalizeAngle(alpha - pi());
7.            beta = normalizeAngle(beta - pi());
8.            direction = -1;
9.            % 更新 omega
10.           omega = parameters.Kalpha * alpha + parameters.Kbeta * beta;
11.       end
12.
13.       if parameters.useConstantSpeed
14.           % 根据 vu 的缩放调整 omega
```

```
15.         omega = omega * (parameters.constantSpeed / vu);
16.         % 常数速度
17.         vu = direction * parameters.constantSpeed;
18.     end
19. end
```