02 Speed Control loop FOC ACIM

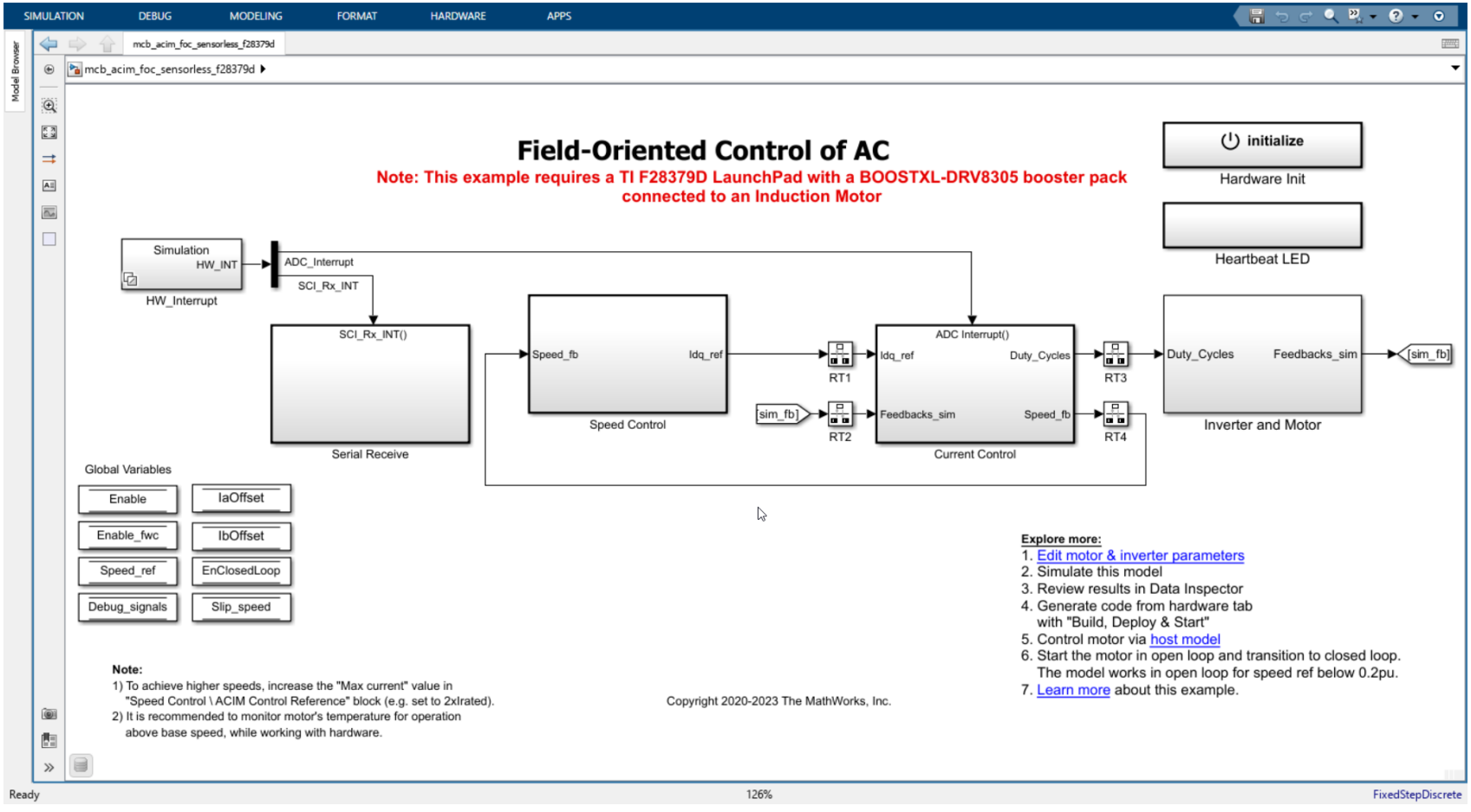

Figure: Field Oriented Control of ACIM

Speed Control loop

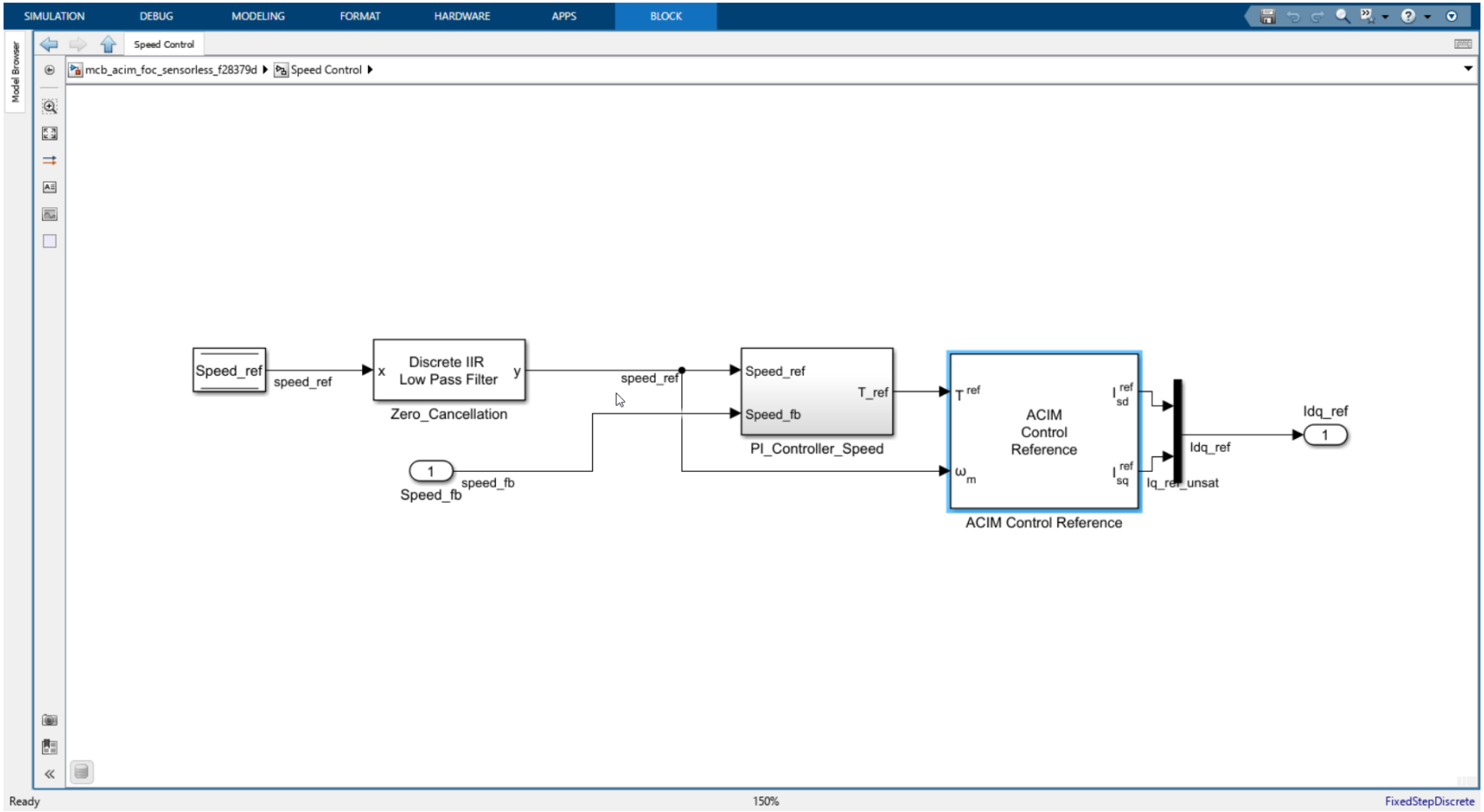

Figure: Speed Control loop for FOC ACIM

Discrete PID Controller with anti-windup block

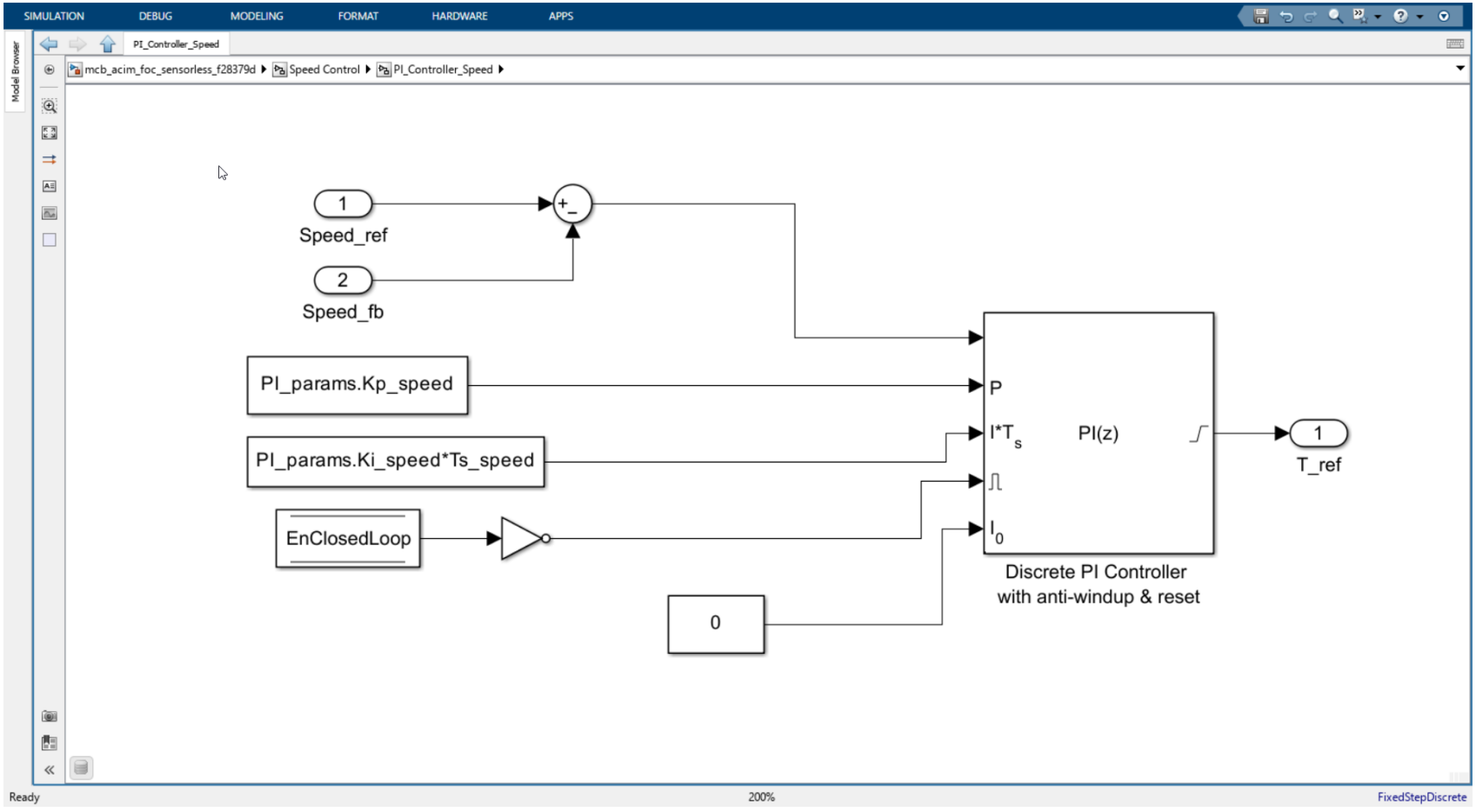

Figure: Discrete PID Controller with anti-windup block

ACIM Control reference

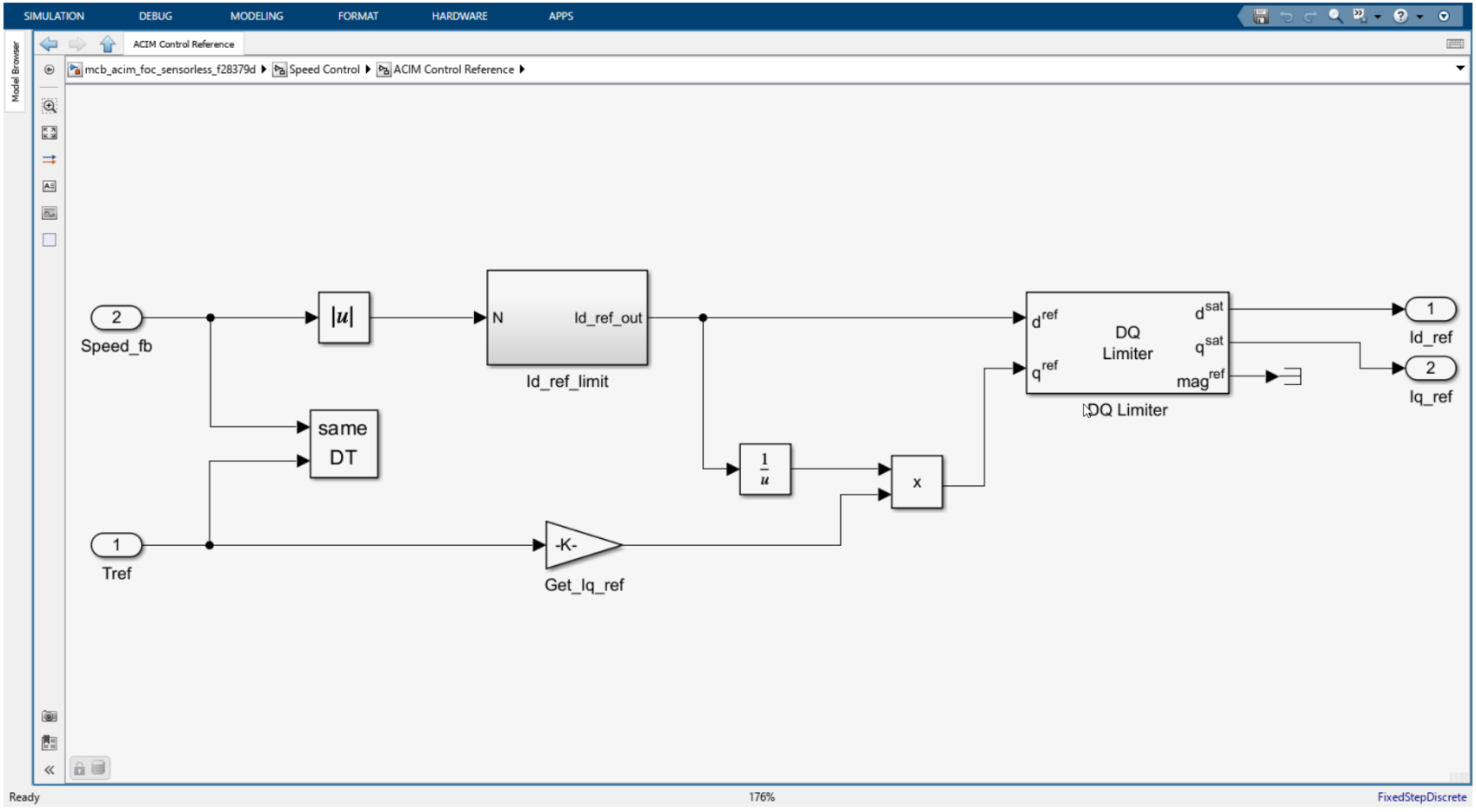

Figure: ACIM Control reference

ACIM Control reference

- ACIM Control reference callback code

DQ Limiter

- Scales down d-axis and q-axis components proportionally when reference signal exceeds saturation limit.
- Prioritizes d-axis or q-axis component, clamping it within the saturation limit first.
- Calculates the remaining component based on the available magnitude within the saturation limit.
- Uses sign function to preserve original direction and min/max functions to ensure magnitudes do not exceed the saturation limit.
- Equations are complex to maintain the relationship between d-axis and q-axis components while ensuring magnitudes stay within the saturation limit.
- DQ limiter block in Simulink

DQ Limiter

- Scales down d-axis and q-axis components proportionally when reference signal exceeds saturation limit.
- Prioritizes d-axis or q-axis component, clamping it within the saturation limit first.
- Calculates the remaining component based on the available magnitude within the saturation limit.
- Uses sign function to preserve original direction and min/max functions to ensure magnitudes do not exceed the saturation limit.
- Equations are complex to maintain the relationship between d-axis and q-axis components while ensuring magnitudes stay within the saturation limit.
- DQ limiter block in Simulink

DQ Limiter

- Scales down d-axis and q-axis components proportionally when reference signal exceeds saturation limit.
- Prioritizes d-axis or q-axis component, clamping it within the saturation limit first.
- Calculates the remaining component based on the available magnitude within the saturation limit.
- Uses sign function to preserve original direction and min/max functions to ensure magnitudes do not exceed the saturation limit.
- Equations are complex to maintain the relationship between d-axis and q-axis components while ensuring magnitudes stay within the saturation limit.
- DQ limiter block in Simulink

DQ Limiter

- Scales down d-axis and q-axis components proportionally when reference signal exceeds saturation limit.
- Prioritizes d-axis or q-axis component, clamping it within the saturation limit first.
- Calculates the remaining component based on the available magnitude within the saturation limit.
- Uses sign function to preserve original direction and min/max functions to ensure magnitudes do not exceed the saturation limit.
- Equations are complex to maintain the relationship between d-axis and q-axis components while ensuring magnitudes stay within the saturation limit.
- DQ limiter block in Simulink

DQ Limiter

- Scales down d-axis and q-axis components proportionally when reference signal exceeds saturation limit.
- Prioritizes d-axis or q-axis component, clamping it within the saturation limit first.
- Calculates the remaining component based on the available magnitude within the saturation limit.
- Uses sign function to preserve original direction and min/max functions to ensure magnitudes do not exceed the saturation limit.
- Equations are complex to maintain the relationship between d-axis and q-axis components while ensuring magnitudes stay within the saturation limit.
- DQ limiter block in Simulink

DQ Limiter

- Scales down d-axis and q-axis components proportionally when reference signal exceeds saturation limit.
- Prioritizes d-axis or q-axis component, clamping it within the saturation limit first.
- Calculates the remaining component based on the available magnitude within the saturation limit.
- Uses sign function to preserve original direction and min/max functions to ensure magnitudes do not exceed the saturation limit.
- Equations are complex to maintain the relationship between d-axis and q-axis components while ensuring magnitudes stay within the saturation limit.
- DQ limiter block in Simulink

Speed Control loop

- *Speed_ref* variable from host computer to through serial communication.
- Low pass filter to cancel the zeros by adding poles.
- Discrete PI Controller with anti-windup block to generate *torque_ref* .
- *speed_fb* is the motor speed estimated by the Speed Estimation block.
- ACIM Control reference block to generate *Isd_ref* and *Isq_ref* as output.

Speed Control loop

- *Speed_ref* variable from host computer to through serial communication.
- Low pass filter to cancel the zeros by adding poles.
- Discrete PI Controller with anti-windup block to generate *torque_ref* .
- *speed_fb* is the motor speed estimated by the Speed Estimation block.
- ACIM Control reference block to generate *Isd_ref* and *Isq_ref* as output.

Speed Control loop

- *Speed_ref* variable from host computer to through serial communication.
- Low pass filter to cancel the zeros by adding poles.
- Discrete PI Controller with anti-windup block to generate *torque_ref* .
- *speed_fb* is the motor speed estimated by the Speed Estimation block.
- ACIM Control reference block to generate *Isd_ref* and *Isq_ref* as output.

Speed Control loop

- *Speed_ref* variable from host computer to through serial communication.
- Low pass filter to cancel the zeros by adding poles.
- Discrete PI Controller with anti-windup block to generate *torque_ref* .
- *speed_fb* is the motor speed estimated by the Speed Estimation block.
- ACIM Control reference block to generate *Isd_ref* and *Isq_ref* as output.

Speed Control loop

- *Speed_ref* variable from host computer to through serial communication.
- Low pass filter to cancel the zeros by adding poles.
- Discrete PI Controller with anti-windup block to generate *torque_ref* .
- *speed_fb* is the motor speed estimated by the Speed Estimation block.
- ACIM Control reference block to generate *Isd_ref* and *Isq_ref* as output.