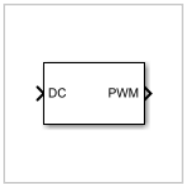
PWM Generator

Generate pulse width modulated signal or waveform

Library: Simscape / Electrical / Control / Pulse Width Modulation



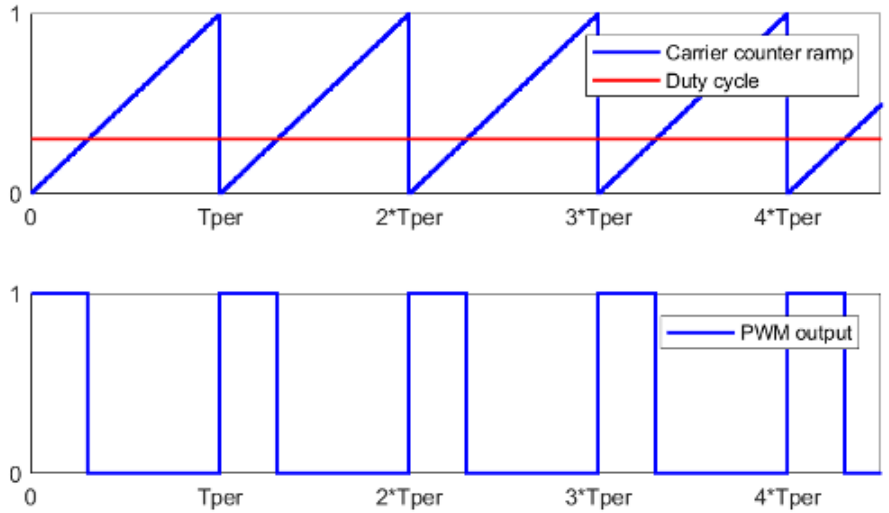
Description

The PWM Generator block implements a PWM generator. The pulse width modulation technique controls power transfer from one electrical component to another by quickly switching between full power transfer and no power transfer.

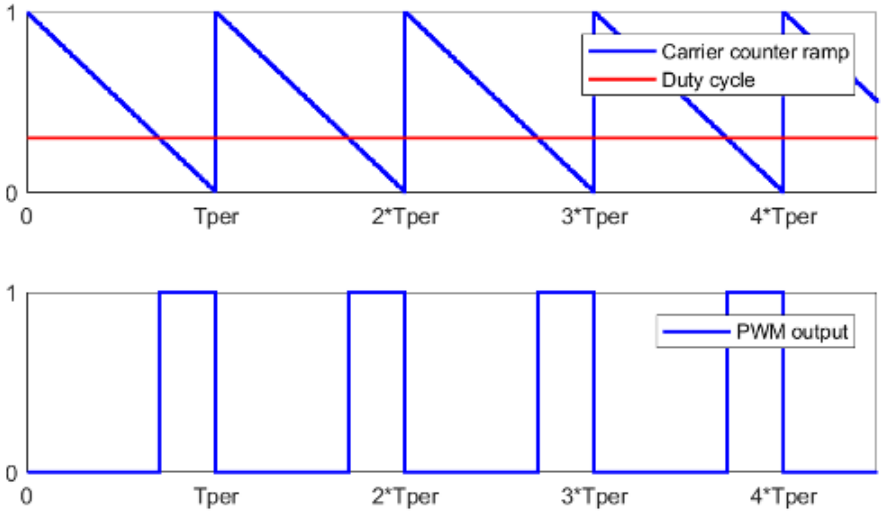
Working Principle

The PWM generator block outputs either `1` when the duty cycle is greater than the carrier counter value, or `0` otherwise. You can set the period of each cycle by specifying the timer period *Tper*. You can change the initial output, or phase, of the PWM output by specifying one of three types of carrier counters:

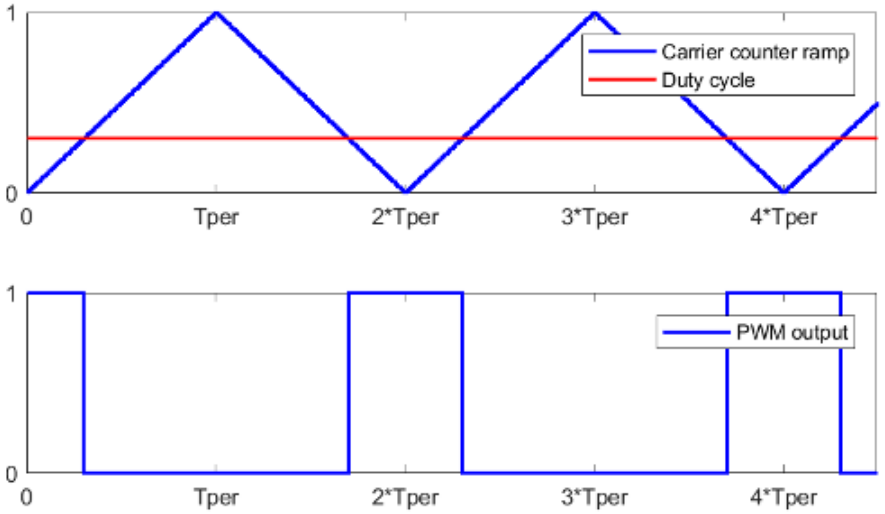
- Up counter — The PWM output signal initializes at the start of the `on` cycle. This graphic shows the carrier counter signal and the corresponding PWM output.



- Down counter — The PWM output signal initializes at the start of the `off` cycle. This graphic shows the carrier counter signal and the corresponding PWM output.



- Up-down counter — The PWM output signal initializes halfway through the on cycle. This graphic shows the carrier counter signal and the corresponding PWM output.



Ports

Input

collapse all

`DC` — Duty cycle
scalar

Duty cycle in the range `[0,1]`.

Data Types: `single` | `double`

Output

collapse all

`PWM` — PWM signal
scalar

Pulse width modulation signal.

Data Types: `single` | `double`

Parameters

collapse all

`Carrier counter` — Carrier counter strategy
`Up` (default) | `Down` | `Up-Down`

Use the carrier counter strategy to change the initial behavior of the PWM output:

- Up counter — PWM output begins at the start of the on state.
- Down counter — PWM output begins at the start of the `off` state.
- Up-down counter — PWM output begins in the middle of the on state.

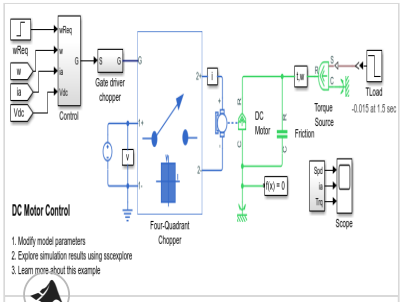
`Timer period (s)` — PWM period
`0.001` (default) | positive number

PWM timer period.

`Sample time` — Block sample time
`5e-5` (default) | positive number

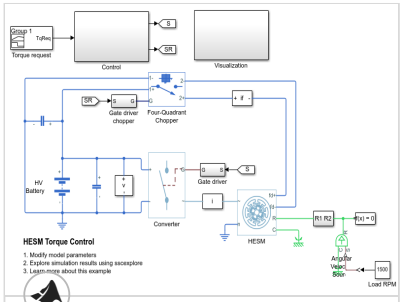
Sample time for the block. For continuous-time simulation, set to zero. For discrete-time simulation, to ensure adequate resolution in the generated signal, specify a positive value that is less than or equal to `10*`T_{per}, where T_{per} is the **Timer period (s)**.

Model Examples



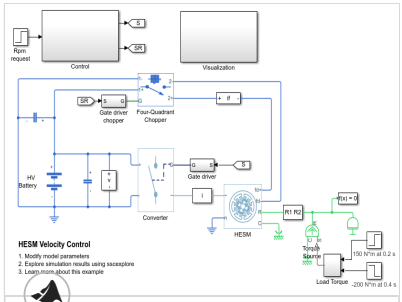
DC Motor Control

A cascade speed-control structure for a DC motor. A PWM controlled four-quadrant Chopper is used to feed the DC motor. The Control



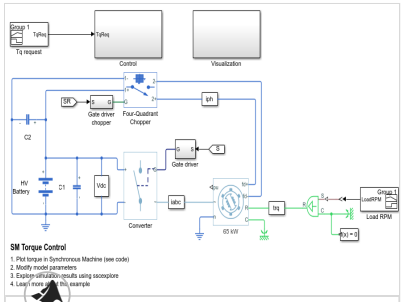
HESM Torque Control

Control the torque in a hybrid excitation synchronous machine (HESM) based electrical-traction drive. Permanent magnets and an



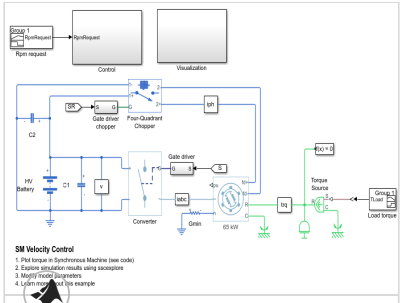
HESM Velocity Control

Control the rotor angular velocity in a hybrid excitation synchronous machine (HESM) based electrical-traction drive. Permanent magnets



SM Torque Control

Control the torque in a synchronous machine (SM) based electrical-traction drive. A high-voltage battery feeds the SM through a controlled



SM Velocity Control

Control the rotor angular velocity in a synchronous machine (SM) based electrical-traction drive. A high-voltage battery feeds the SM

Extended Capabilities

C/C++ Code Generation
Generate C and C++ code using Simulink® Coder™.

See Also

Blocks

PWM Generator | PWM Generator (Three-phase, Three-level) | PWM Generator (Three-phase, Two-level) | Thyristor 6-Pulse Generator

Introduced in R2017b