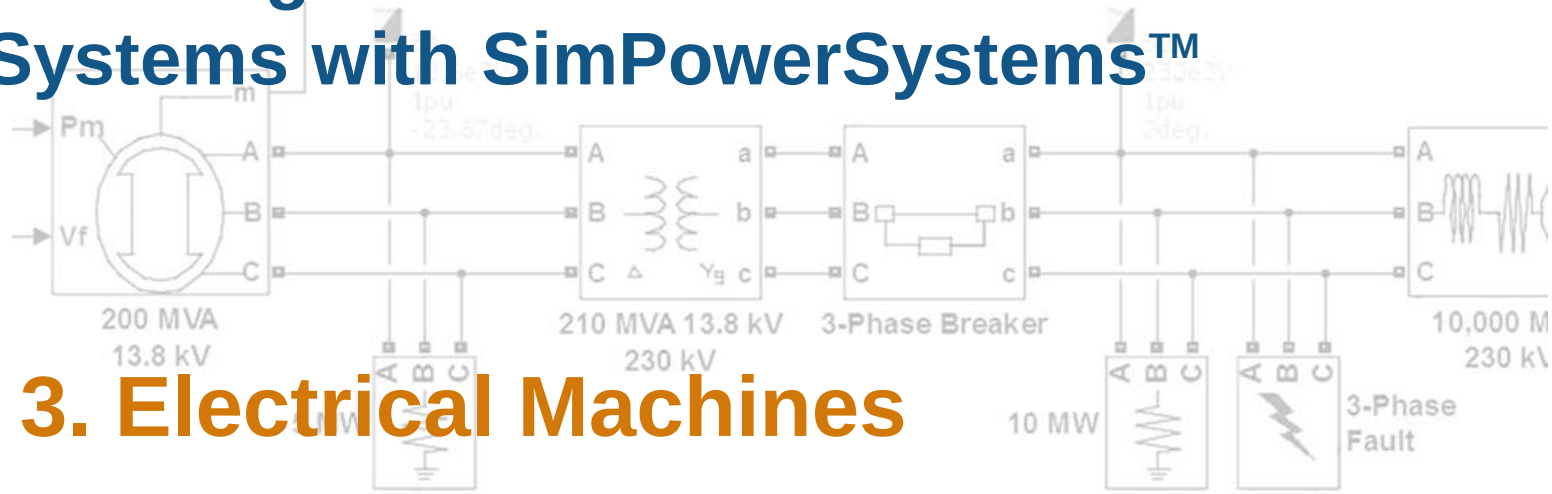
SimPowerSystems Hands-on Workshop:
Modeling and Simulation of Electrical Power Systems with SimPowerSystems™



3. Electrical Machines

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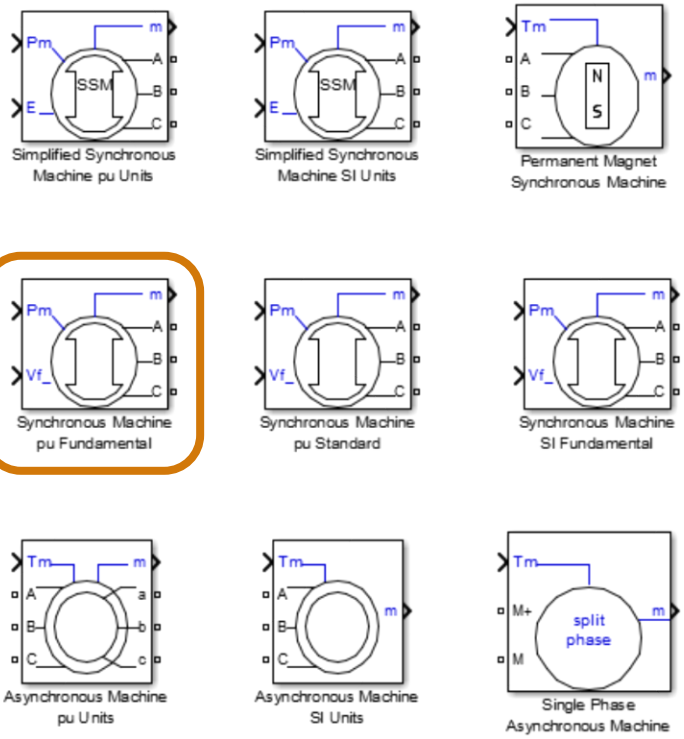
Outline

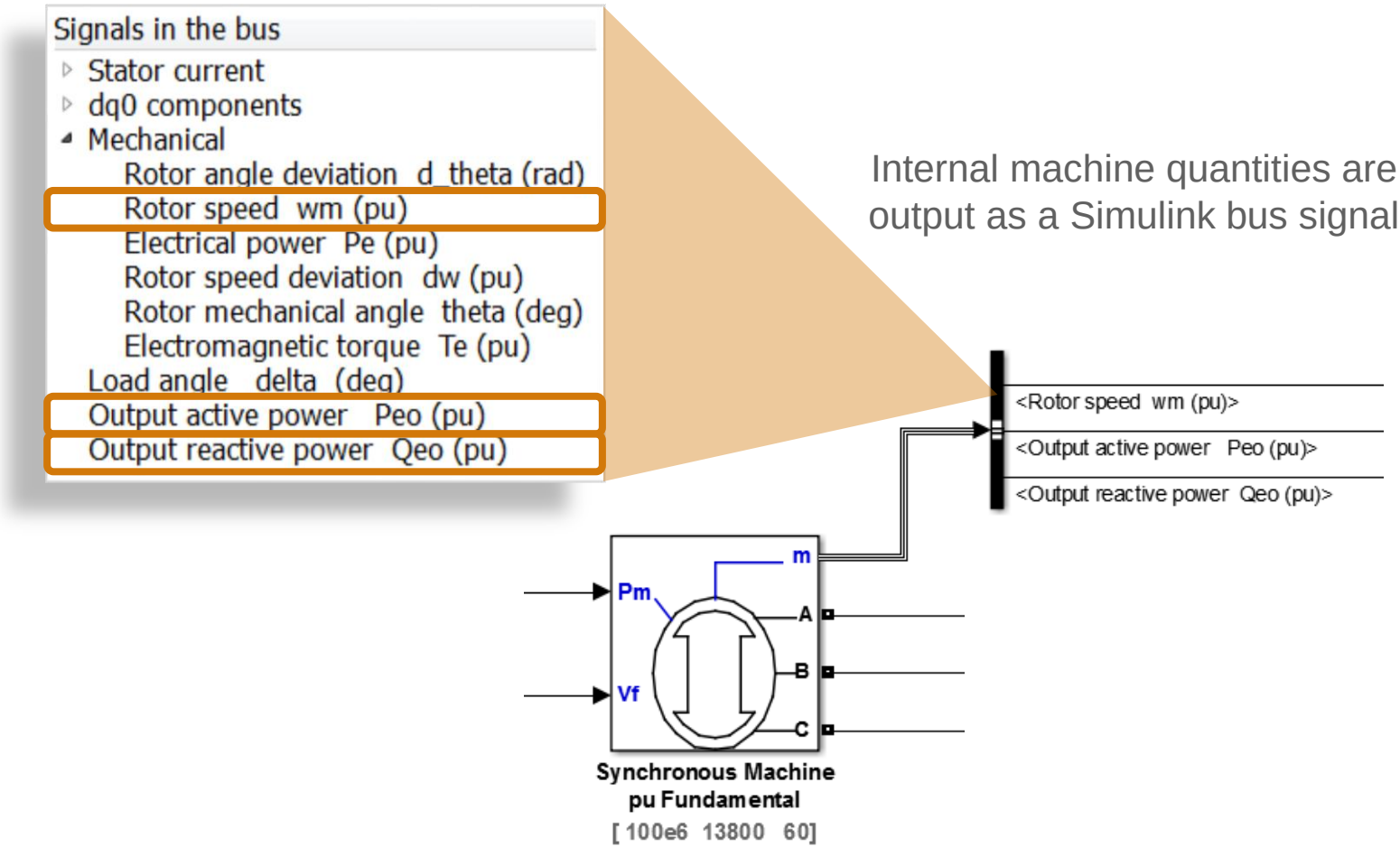
- Machine measurements
- Machine initialization
- Load flow calculation
- Connections to mechanical loads and prime movers

Electrical machines library



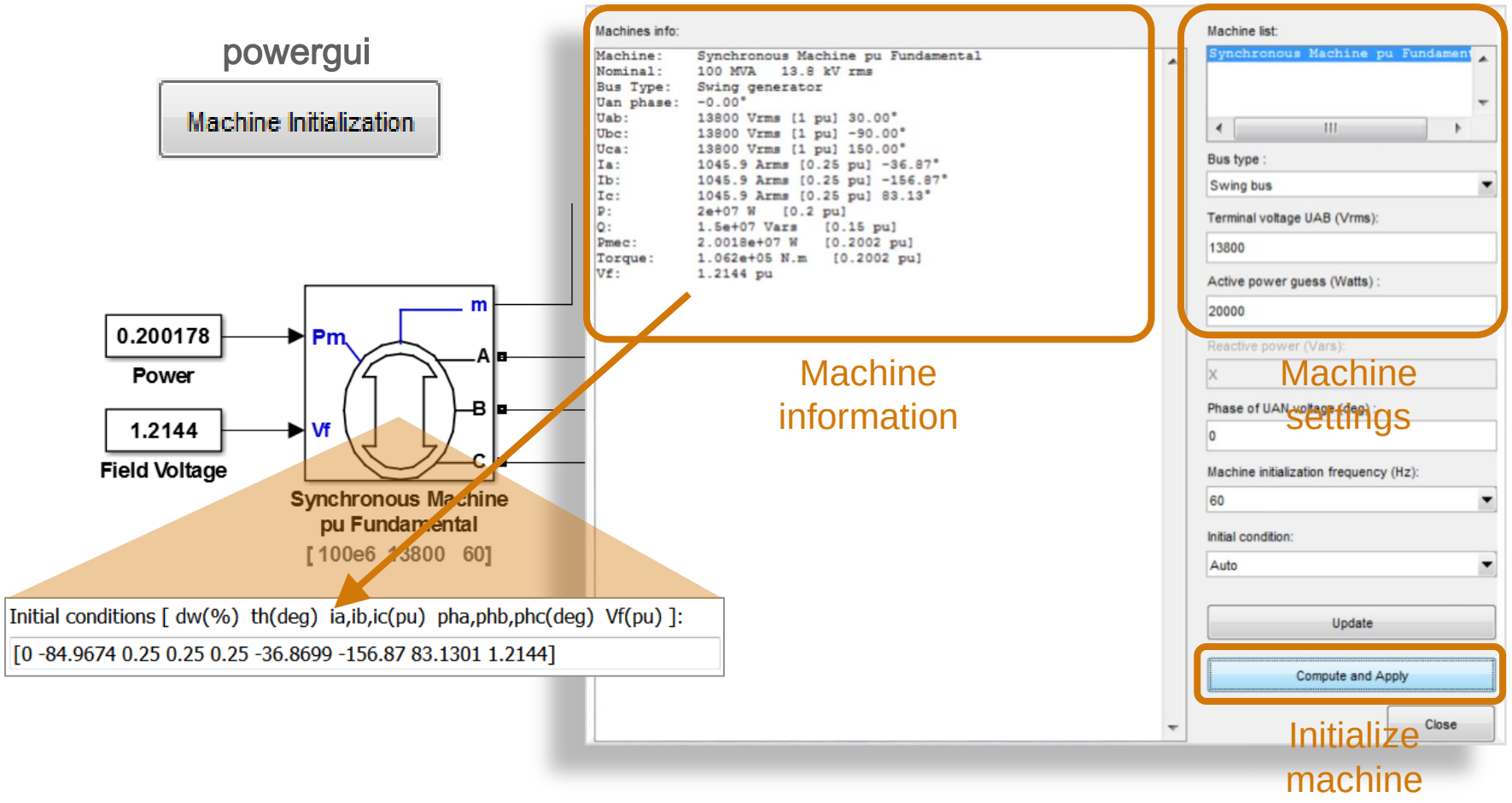
- Synchronous and asynchronous machines
- Detailed and simplified models
- Generator mode or motor mode
- PQ generators or PV generators
- SI units or per unit system

Machine measurements




```
>> single_generator_init
```

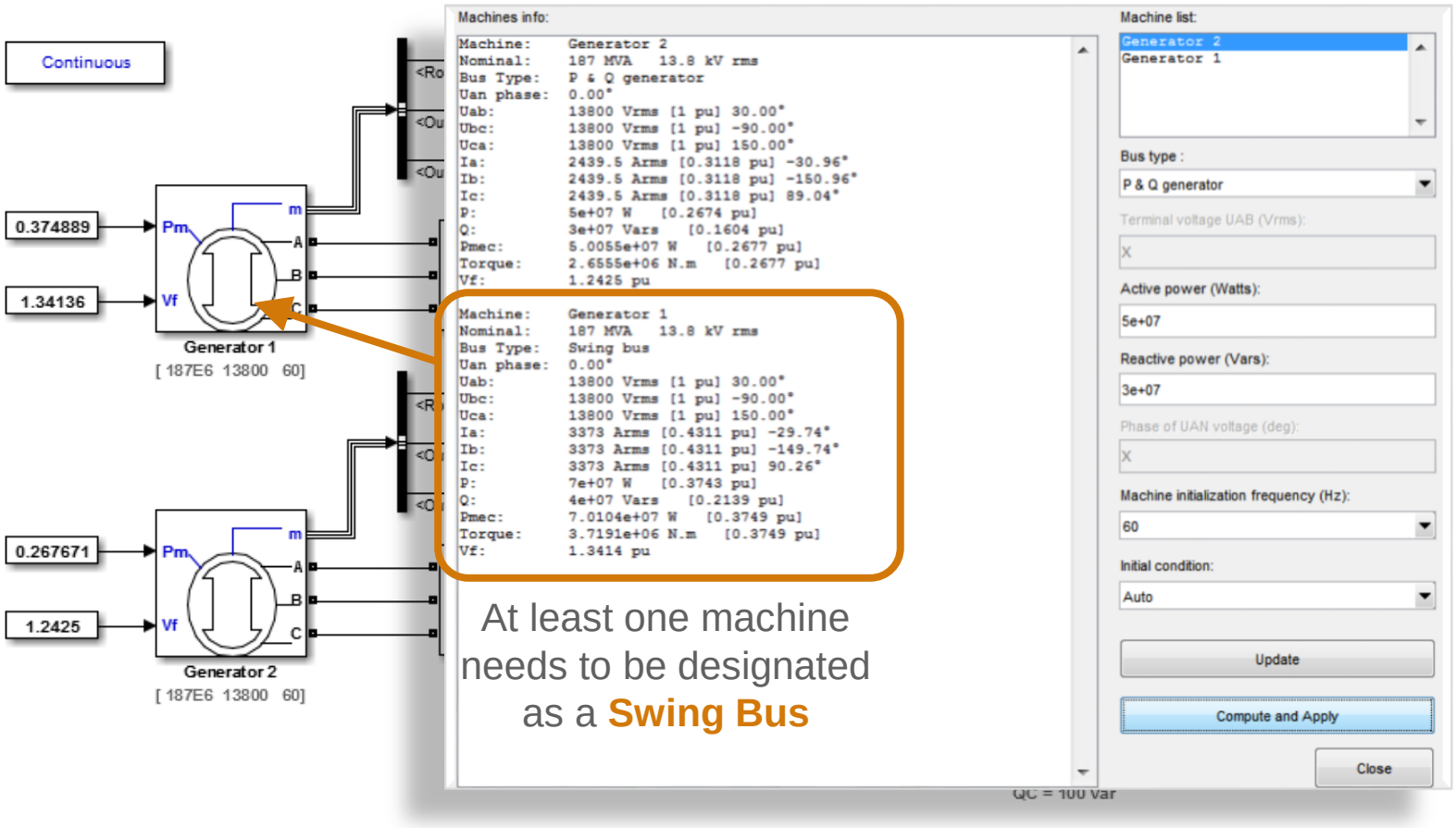
Machine initialization




```
>> single_generator_initFinish
```

Machine initialization

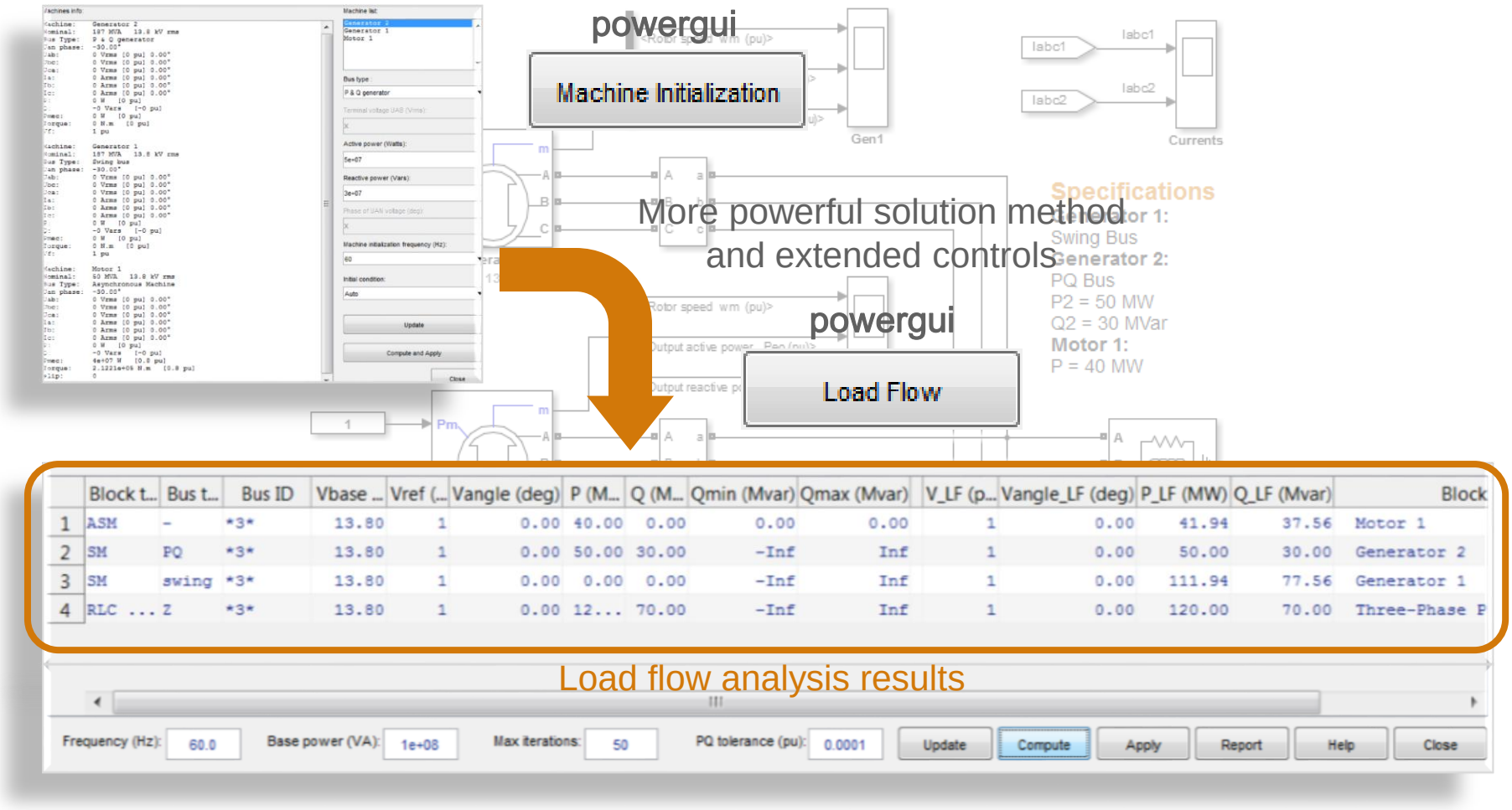
Multiple machines



At least one machine needs to be designated as a **Swing Bus**

```
>> two_generators_initFinish
```

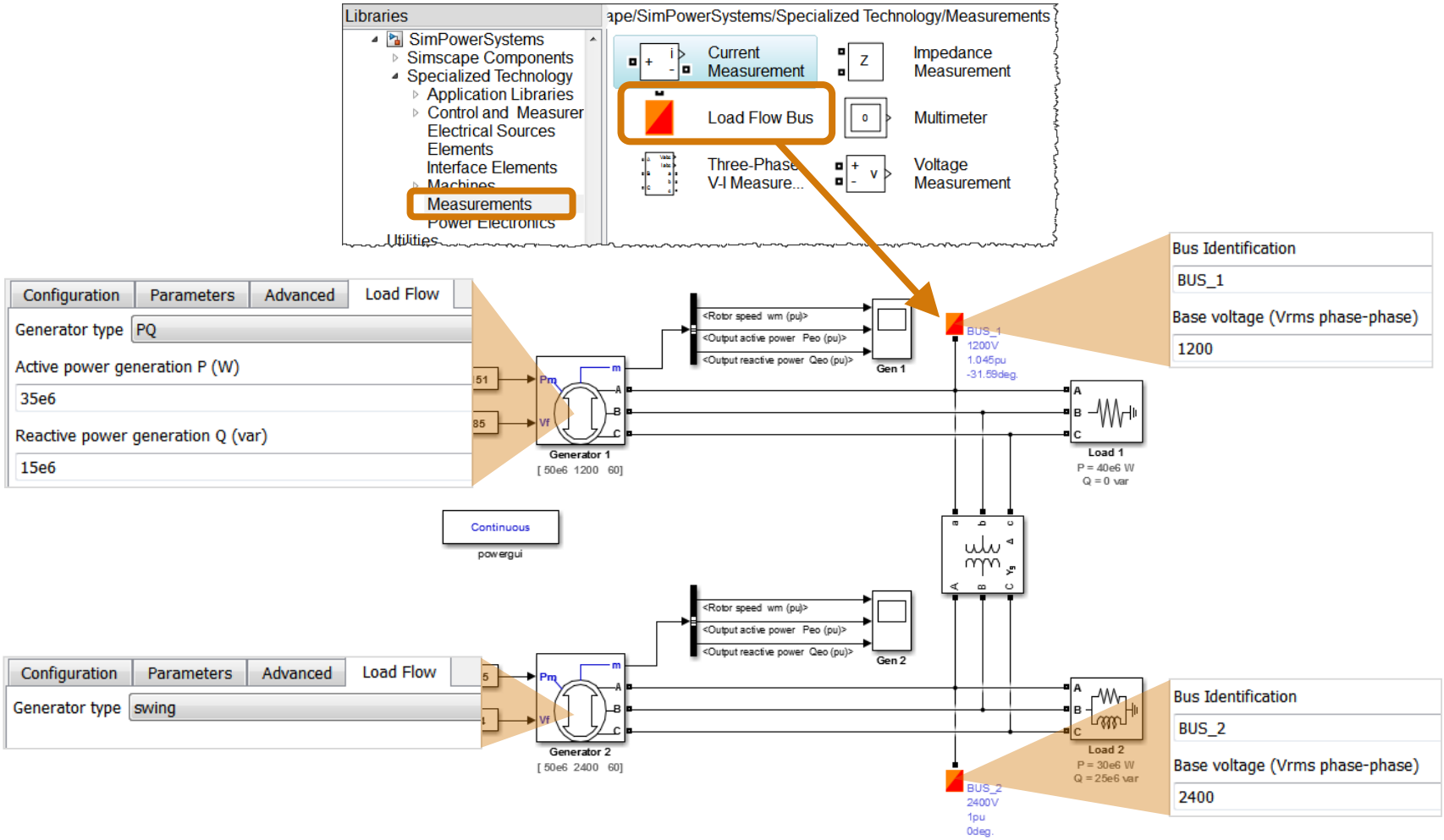
Load flow calculation



	Block t...	Bus t...	Bus ID	Vbase ...	Vref (...	Vangle (deg)	P (M...	Q (M...	Qmin (Mvar)	Qmax (Mvar)	V_LF (p...	Vangle_LF (deg)	P_LF (MW)	Q_LF (Mvar)	Block
1	ASM	-	*3*	13.80	1	0.00	40.00	0.00	0.00	0.00	1	0.00	41.94	37.56	Motor 1
2	SM	PQ	*3*	13.80	1	0.00	50.00	30.00	-Inf	Inf	1	0.00	50.00	30.00	Generator 2
3	SM	swing	*3*	13.80	1	0.00	0.00	0.00	-Inf	Inf	1	0.00	111.94	77.56	Generator 1
4	RLC ... Z		*3*	13.80	1	0.00	12...	70.00	-Inf	Inf	1	0.00	120.00	70.00	Three-Phase P

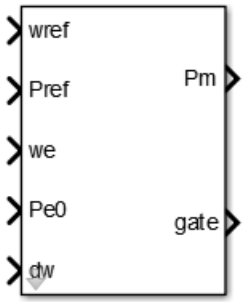
```
>> two_generators_motor
```

Load flow calculation

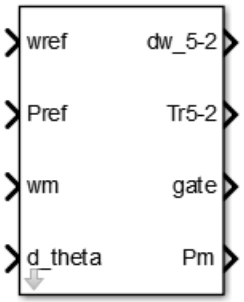



```
>> two_generators_loadFlowFinish
```

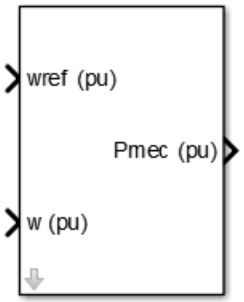
Connections to mechanical loads and prime movers



Hydraulic Turbine and Governor

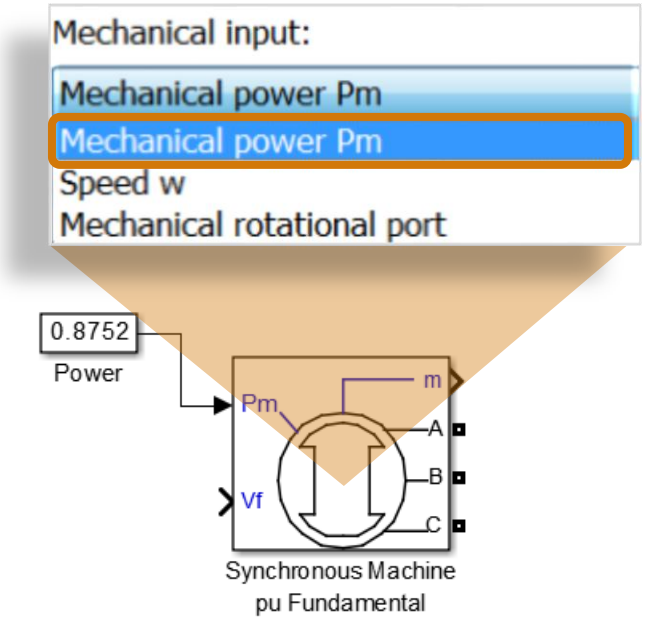


Steam Turbine and Governor

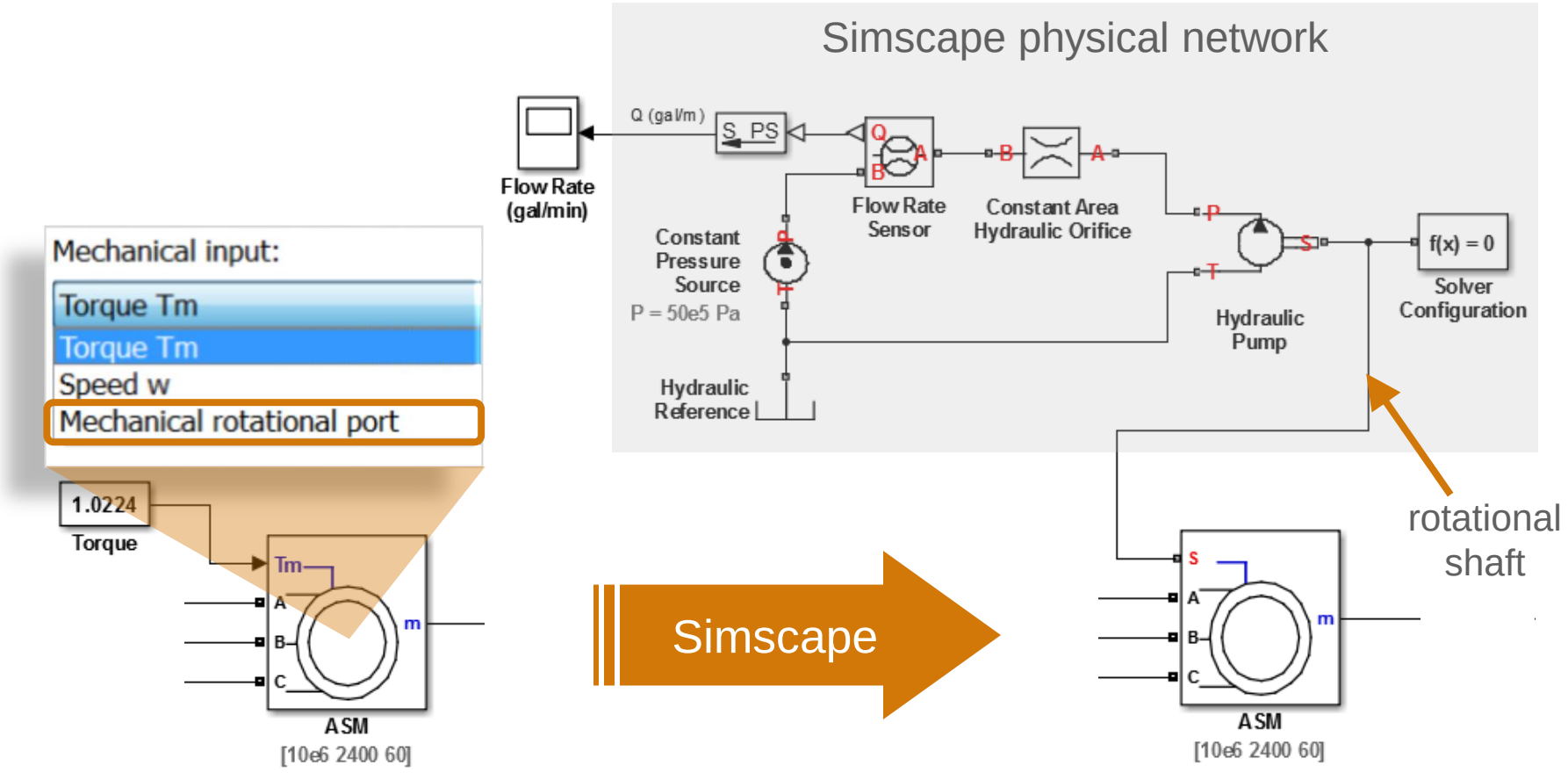


Diesel Engine and Governor

Direct connections to mechanical power sources – for generators – and loads – for motors – using standard Simulink signals



Connections to mechanical loads and prime movers




```
>> motor_simscapepump
```