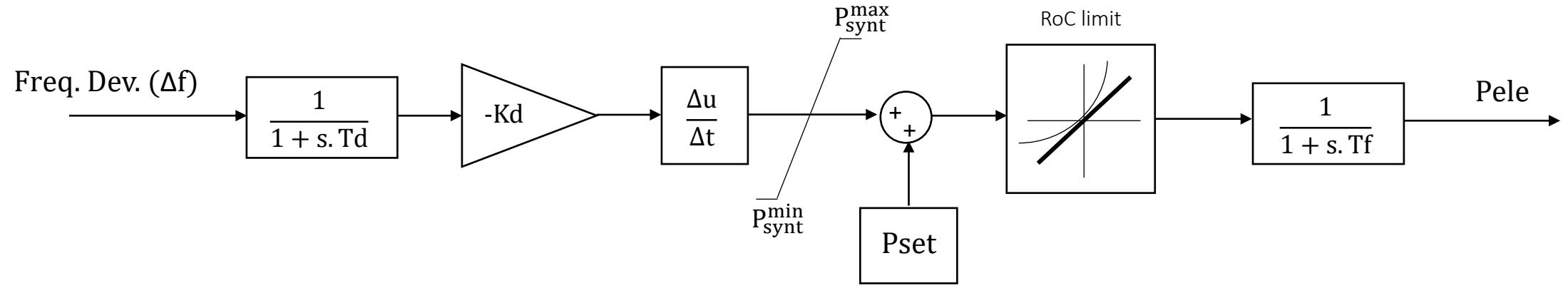


# Frades 2 – Variable speed model for SI (with and without SPPS)

## Block Diagram for Synthetic Inertia provision



# Frades 2 – Variable speed model for SI (with and without SPPS)

## Model's input signals, output signals and parameters

### Input signals:

- $\Delta f$  – grid frequency deviation from setpoint, given by  $f_{\text{grid}} - f_{\text{set}}$  (p.u.)
- $P_{\text{set}}$  – active power setpoint (p.u.)

### Output signals:

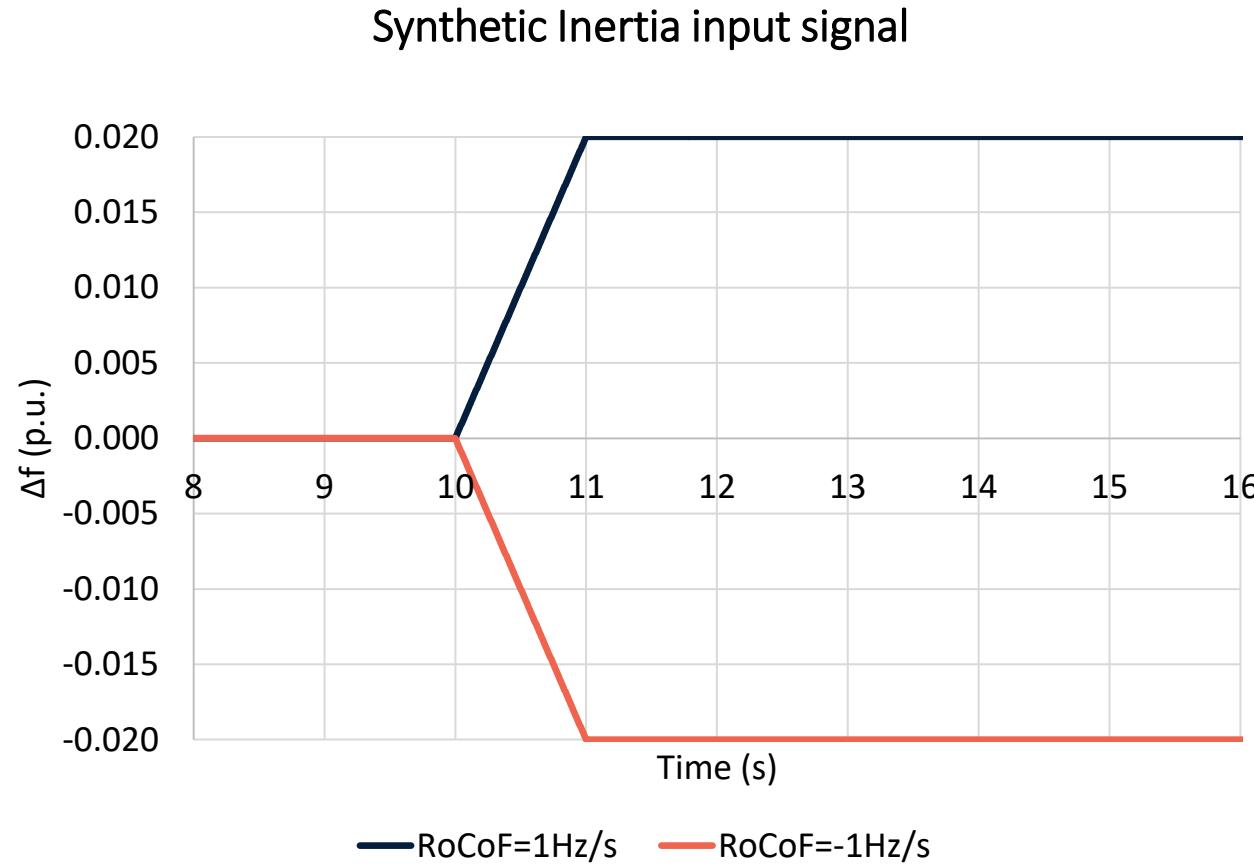
- $P_{\text{ele}}$  – electrical active power (p.u.)

### Parameters:

- $T_d$  – filter time constant for SI (s)
- $K_d$  – derivative gain (p.u.)
- $P_{\text{synt}}^{\max}$  – SI maximum limit (p.u.)
- $P_{\text{synt}}^{\min}$  – SI minimum limit (p.u.)
- RoC limit – Rate of Change limit (p.u./s)
- $T_f$  – converters delay time constant (s)

# Frades 2 – Variable speed model for SI (with and without SPPS)

## Synthetic Inertia input signals

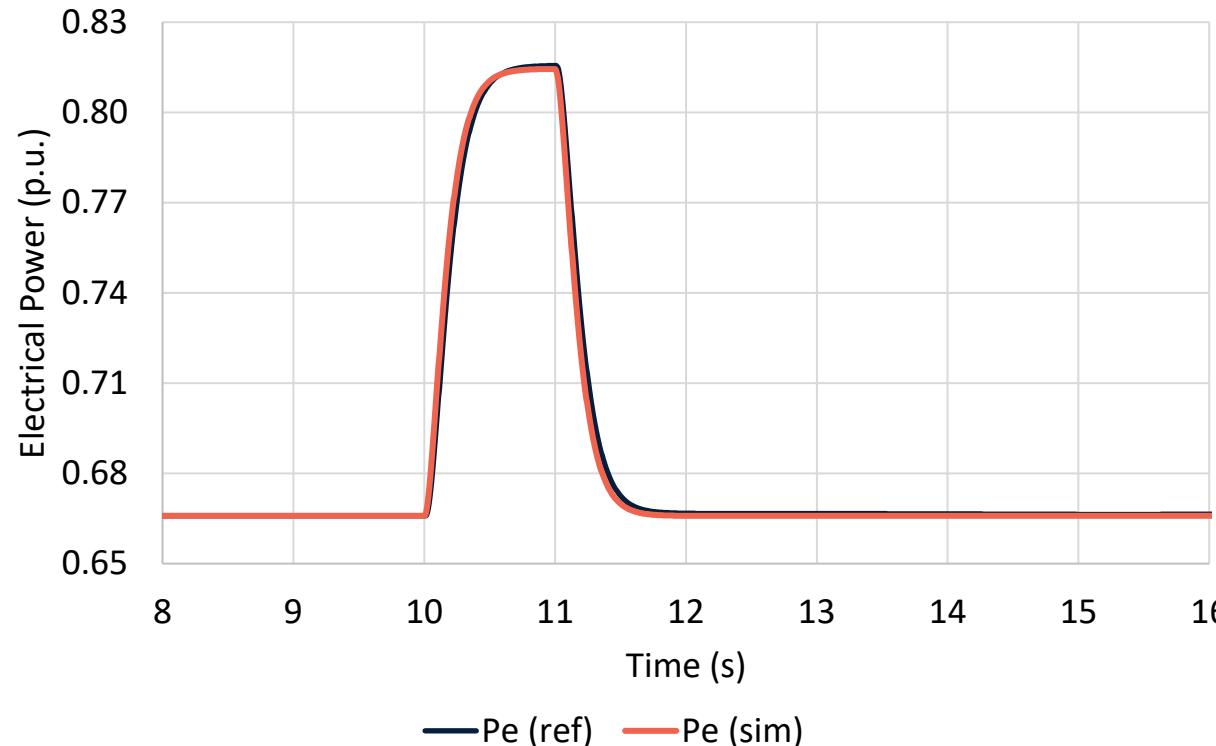


# Frades 2 – Variable speed model for SI (with and without SPPS)

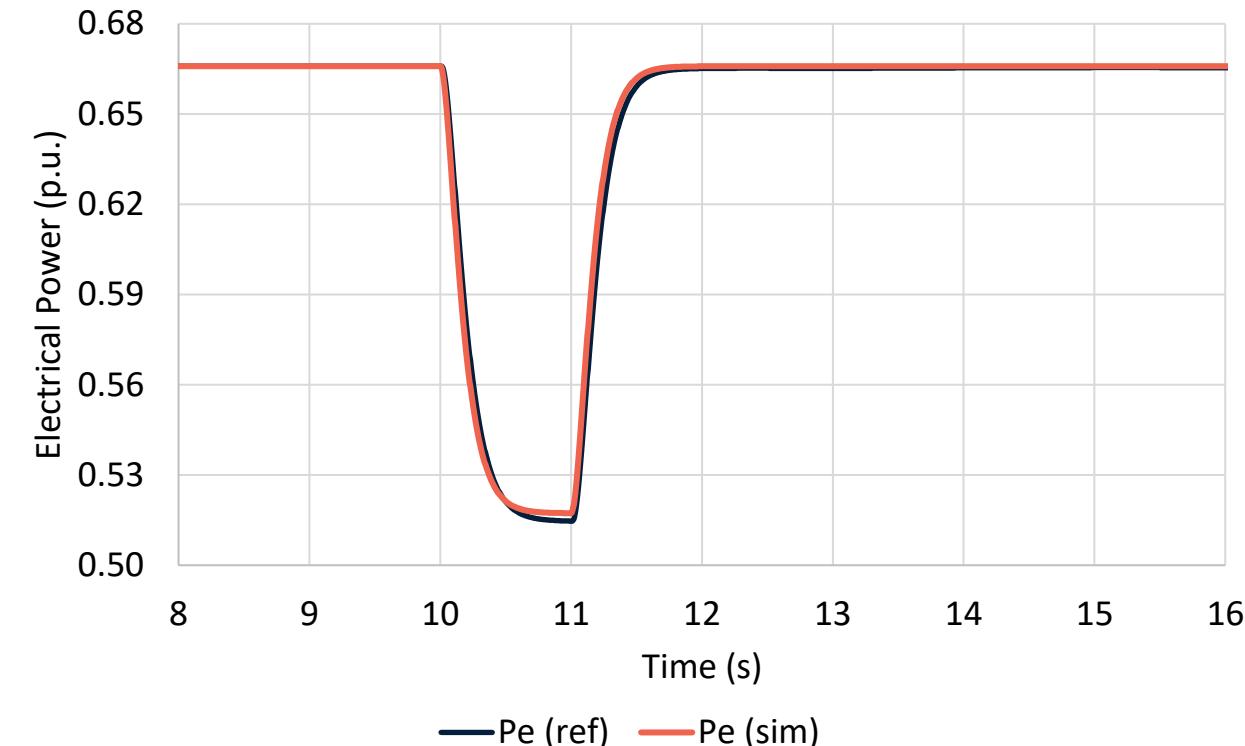
## Synthetic Inertia service provision

Turbine Mode

Frequency deviation: RoCoF= -1 Hz/s



Frequency deviation: RoCoF= +1 Hz/s



# **Frades 2 – Variable speed model for SI (with and without SPPS)**

## **Synthetic Inertia service provision**

Pump Mode

Operation mode not assessed