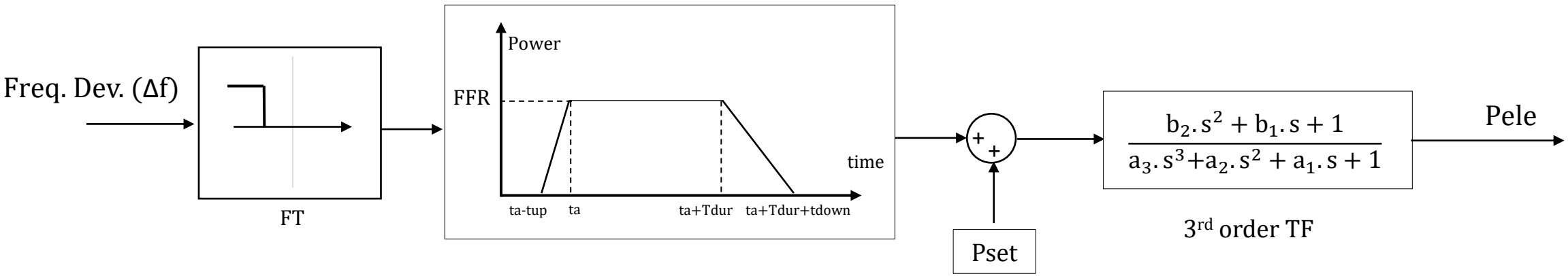
Z'Mutt – Variable speed model for FFR (with and without SPPS)

Block Diagram for FFR provision



Z'Mutt – Variable speed model for FFR (with and without SPPS)
Model's input signals, output signals and parameters

Input signals:

- Δf – grid frequency deviation from setpoint, given by fgrid - fset (p.u.)
- Pset – active power setpoint (p.u.)

Output signals:

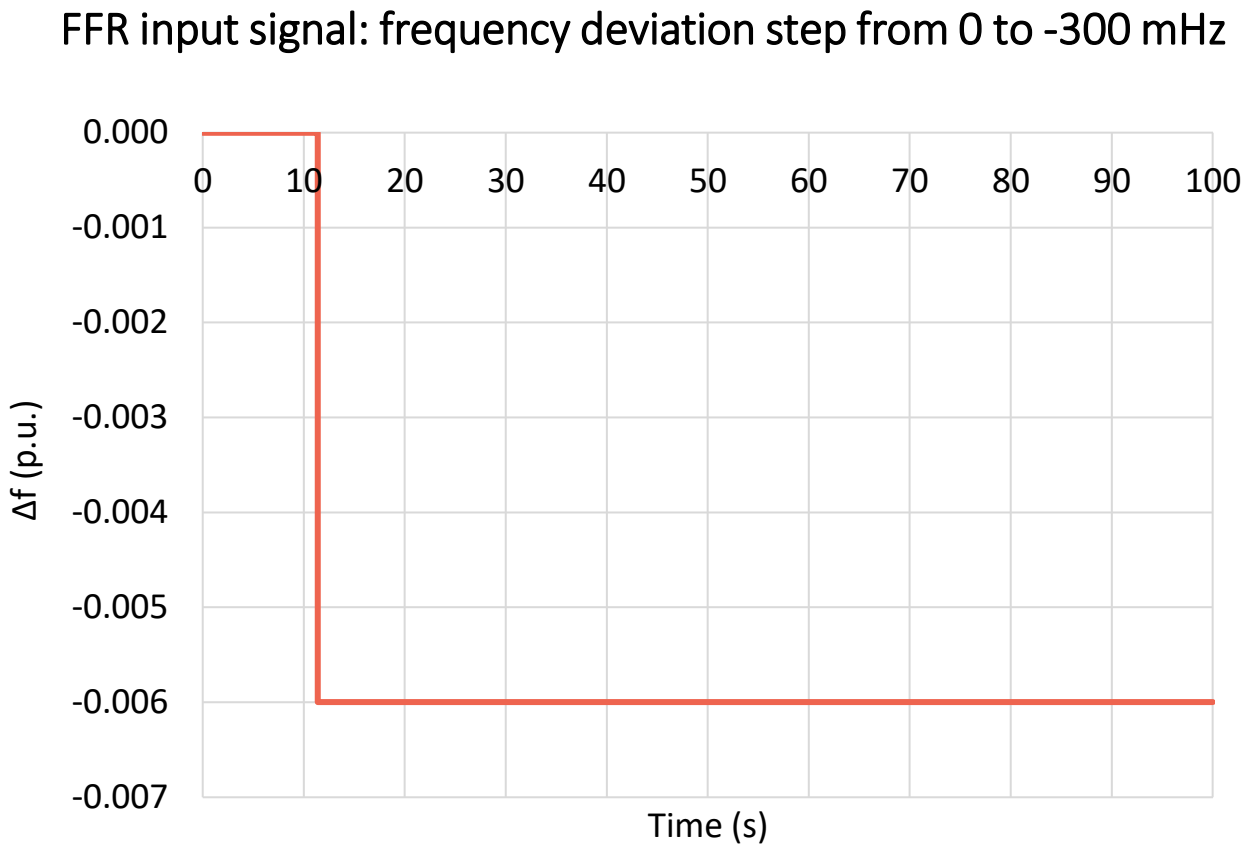
- Pele – electrical active power (p.u.)

Parameters:

- FT – frequency deviation threshold (p.u.)
- FFR – FFR capacity (p.u.)
- ta – full activation time (s)
- Tdur – support duration time (s)
- a1, a2, a3, b1, b2 – 3rd order transfer function parameters
- tup – Ramp up time (s)
- tdown – Ramp down time (s)

Z'Mutt – Variable speed model for FFR (with and without SPPS)

FFR input signal



Z'Mutt – Variable speed model for FFR (with and without SPPS)
FFR service provision

Turbine Mode (with and without SPPS)

No capability to comply with service requirements

Pump Mode (with and without SPPS)