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SUBROUTINE updateControlParameters( HSS_Spd, ZTime )

USE                             precision
USE                             EAControl   ! contains variables: TimeDRStart,
TimeDREnd, DerateFactor, TEmShutdown, maxOverspeed, EmergencyShutdown, GenSpeedF,
PC_RefSpd, PC_MinPit, VS_Rgn2_K, and VS_RtPwr. See EAControl module in FAST_Mods.f90
for variable descriptions.

IMPLICIT                        NONE

   ! Passed Variables:
REAL(ReKi), INTENT(IN)      :: HSS_Spd  ! Current  HSS (generator) speed, rad/s.
REAL(ReKi), INTENT(IN )     :: ZTime    ! Current simulation time, sec.

    ! Local variables storing baseline control parameters (FROM the controller
described in the NREL 5MW specifications)
REAL(ReKi), PARAMETER               :: PC_MinPit_baseline     = 0.0     ! Minimum
pitch setting in NREL 5MW baseline pitch controller, rad.
REAL(ReKi), PARAMETER               :: PC_RefSpd_baseline     = 122.9096 ! Desired
(reference) HSS speed for NREL 5MW baseline pitch controller, rad/s.
REAL(ReKi), PARAMETER               :: VS_Rgn2K_baseline      = 2.332287 ! Generator
torque constant in Region 2 (HSS side) for NREL 5MW baseline controller,
N-m/(rad/s)^2.
REAL(ReKi), PARAMETER               :: VS_RtGnSp_baseline     = 121.6805 ! Rated
generator speed (HSS side) for NREL 5MW baseline controller, rad/s. -- chosen to be
99% of PC_RefSpd
REAL(ReKi), PARAMETER               :: VS_RtPwr_baseline      = 5296610.0  ! Rated
generator generator power in Region 3 for NREL 5MW baseline controller, Watts. --
chosen to be 5MW divided by tthe electrical generator efficiency of 94.ReKi%
REAL(ReKi), PARAMETER               :: VS_Rgn2Sp_baseline     = 91.21091   !
Transitional generator speed (HSS side) between regions 1 1/2 and 2 for NREL 5MW
baseline controller, rad/s.
REAL(ReKi), PARAMETER               :: VS_CtInSp_baseline     = 70.16224   !
Transitional generator speed (HSS side) between regions 1 and 1 1/2 for NREL 5MW
baseline controller, rad/s.

    !Local variables used to filter generator speed
REAL(ReKi)                      :: Alpha                  ! Current coefficient in the
recursive, single-pole, low-pass filter, (-).
REAL(ReKi), SAVE                :: LastTime               ! Last time this subroutine
was called, sec.
REAL(ReKi), PARAMETER           :: CornerFreq    =       1.570796  ! Corner frequency
(-3dB point) in the recursive, single-pole, low-pass filter, rad/s. -- chosen to be
1/4 the blade edgewise natural frequency ( 1/4 of approx. 1Hz = 0.25Hz =
1.570796rad/s)

    !Local variables used for derate calculations
REAL(ReKi), PARAMETER             :: pDR = 0.2     !- poles of the second order
derate input filter.
REAL(ReKi), SAVE                  :: FF_pwrFactor = 1.0 ! The derate factor. A
fraction of 1, where 1 is not derated.
REAL(ReKi), PARAMETER, DIMENSION (17)   :: DRPitchArray = (/ 0.1178, 0.1091, &
0.1004, 0.0916, 0.0829, 0.0742, 0.0654, 0.0611, 0.0524, 0.0436, 0.0393, 0.0349, &
0.0305, 0.0262, 0.0218, 0.0131, 0.0 /) !Array of minimum pitch values, (radians)
REAL(ReKi), PARAMETER, DIMENSION (17)   :: DRArray   = (/ 0.5789, 0.6184, 0.6579, &
0.6974, 0.7368, 0.7763, 0.8158, 0.8289, 0.8684, 0.9079, 0.9211, 0.9342, 0.9474, &
0.9605, 0.9737, 0.9868, 1.0000 /) !Array of derate values corresponding to the minimum
pitch array
INTEGER(4)                        :: interpCounter !This is an index used by the
minimum pitch interpolation DO loop.
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