Model-based Load Following Control for Helical-coiled Supercritical Steam Generator of MHTGR

Model Formulation			
ρ	density (kg/m^3)	h	enthalpy (J/kg)
W	mass velocity (kg/s·m^2)	l	length (m)
Q	heat flux (W/m^2)	A	area (m^2)
P	pressure (Pa)	g	gravitational acceleration
ξ	friction coefficient	S	tube vertical distance (m)
T	temperature (K)	C	specific heat (kJ/kg·K)
μ	dynamic viscosity (Pa·s)	λ	thermal conductivity (W/m·K)
H	tube vertical height (m)	$S^{'}$	tube horizontal distance (m)
D	tube outer diameter (mm)	Re	Reynolds number
Pr	Prandtl number	Nu	Nusselt number
θ	tube inclination angle	d	tube inner diameter (mm)
φ	coil diameter (mm)	δ	absolute roughness (mm)
γ	correction factor	α	heat transfer coefficient
K	overall heat transfer coefficient	R_f	fouling resistance
F	throttling resistance (Pa)		
Subscripts			
a	acceleration	b	bulk of water
f	frictional	g	gravity
p	primary	w	wall
st	straight tube	tv	throttling valve
DAEs Formulation			
ϕ	objective function	ω	differential equation
ψ	algebraic equation	p	parameter
Ω_u	weights of control variables	Ω_y	weights of controlled variables
Subscripts			
f	terminal time	L	lower bound
U	upper bound	set	set-point