附录 A

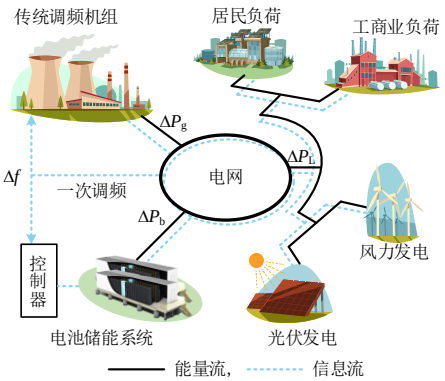


图 A1　电网简化模型

Fig.A1　Simplified model of power grid

附录 B

表 B1　模糊控制规则表

Table B1　Fuzzy control rules

df/dt	Δf						
	NB	NM	NS	Z	PS	PM	PB
NB	VL	L	L	VL	Z	Z	Z
NM	L	L	M	L	Z	Z	S
NS	M	M	M	M	Z	S	S
Z	Z	S	Z	Z	Z	S	Z
PS	S	S	Z	M	M	M	M
PM	S	Z	Z	L	M	L	L
PB	Z	Z	Z	VL	L	L	VL

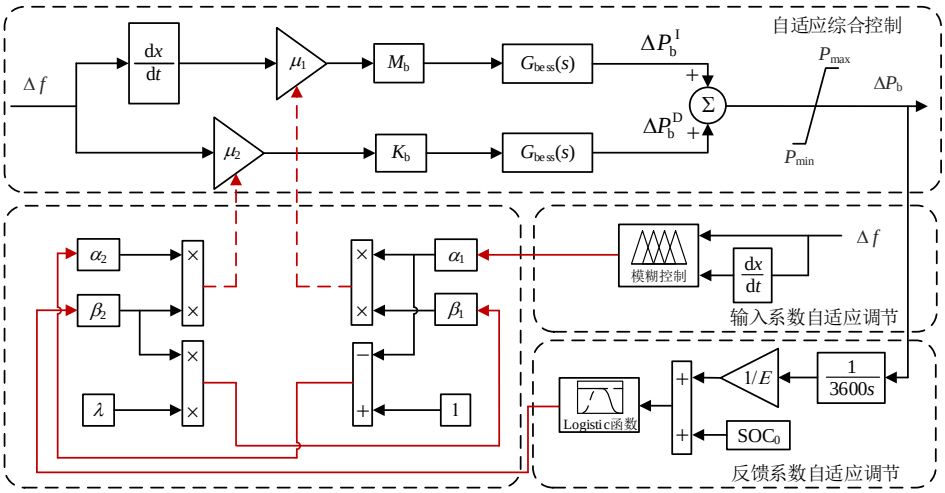


图 B1　电池储能系统一次调频自适应综合控制框图

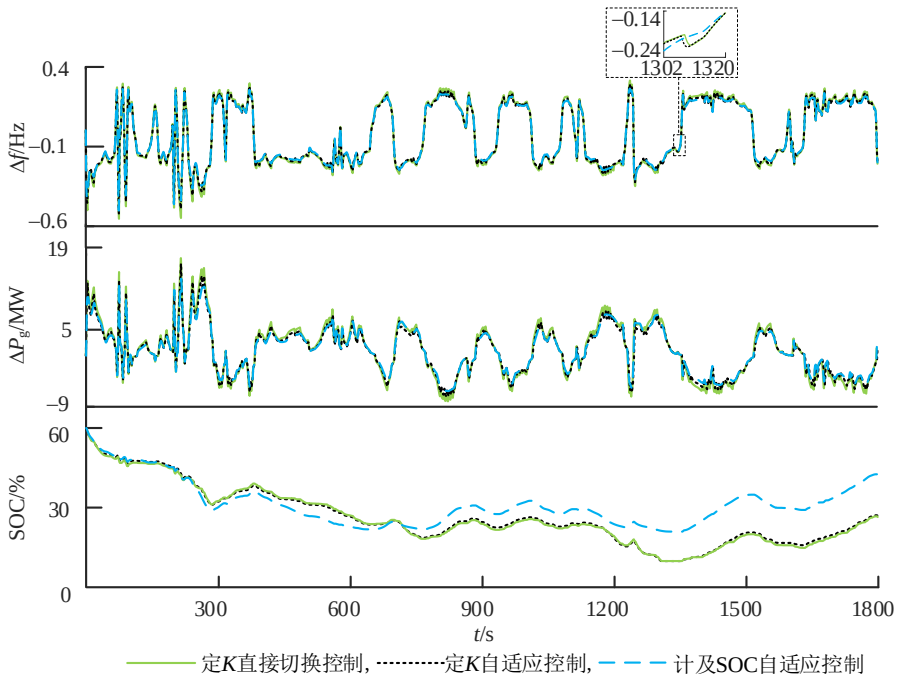
Fig.B1　Block diagram of self-adaptive integrated control of BESS for primary frequency regulation

附录 C

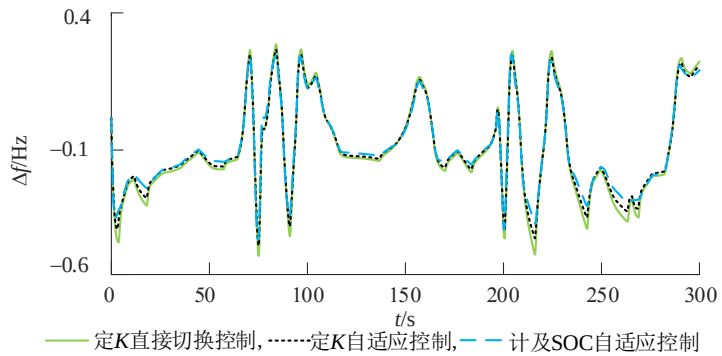
表 C1　仿真参数

Table C1　Simulation parameters

参数	数值	参数	数值
T_g/s	0.08	T_b/s	0.1
T_{CH}/s	0.3	M_b	6
T_{RH}/s	10	K_b	4
F_{HP}	0.5	K_m	1
K_g	17	Q_{SOC_min}	0.1
ΔP_{ACE}	0	Q_{SOC_low}	0.45
D	1	Q_{SOC_high}	0.55
H/s	10	Q_{SOC_max}	0.9



（a）频率偏差、传统机组出力、电池储能系统 SOC 变化曲线(0.5 h)



（b）频率偏差曲线(5 min)

图 C1　连续负荷扰动下频率偏差、传统机组出力、电池储能系统 SOC 变化曲线

Fig.C1　Curves of frequency deviation, output power of traditional units and SOC of BESS under continuous load disturbance