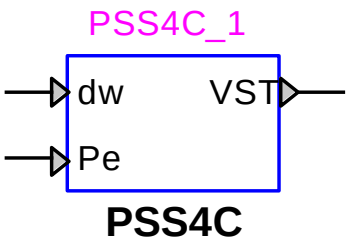
Exciters and Governors: Power System Stabilizer PSS4C



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1 Description

This device is an implementation of the IEEE type PSS4C power system stabilizer model. This device is implemented as described in [1]. Implementation details can be viewed by inspecting the subcircuit of this device.

1.1 Pins

This device has 3 pins:

Pin name	Type	Description	Units
dw	Input	Speed deviation	pu
Pe	Input	Electrical power	pu
VST	Output	PSS output	pu

1.2 Parameters

The default set of parameters can be found in [1].

1.2.1 Data tab

The parameters on the Data tab are:

1. **Gain K_{VL}**: very low band gain
2. **Gain K_{VL1}**: very low band differential filter gain
3. **Coefficient K_{VL11}**: very low band first lead-lag block coefficient
4. **Time constant T_{VL1}**: very low band numerator time constant
5. **Time constant T_{VL2}**: very low band numerator time constant
6. **Time constant T_{VL3}**: very low band numerator time constant
7. **Time constant T_{VL4}**: very low band numerator time constant

8. **Time constant T_{VL5}**: very low band numerator time constant
9. **Time constant T_{VL6}**: very low band numerator time constant
10. **Gain K_{VL2}**: very low band differential filter gain
11. **Coefficient K_{VL17}**: very low band first lead-lag block coefficient
12. **Time constant T_{VL7}**: very low band numerator time constant
13. **Time constant T_{VL8}**: very low band numerator time constant
14. **Time constant T_{VL9}**: vert low band numerator time constant
15. **Time constant T_{VL10}**: very low band numerator time constant
16. **Time constant T_{VL11}**: very low band numerator time constant
17. **Time constant T_{VL12}**: very low band numerator time constant
18. **Very low band upper limit V_{VLmax}**: very low band upper limit
19. **Very Low band lower limit V_{VLmin}**: very low band lower limit
20. **Gain K_L**: low band gain
21. **Gain K_{L1}**: low band differential filter gain
22. **Coefficient K_{L11}**: low band first lead-lag block coefficient
23. **Time constant T_{L1}**: low band numerator time constant
24. **Time constant T_{L2}**: low band numerator time constant
25. **Time constant T_{L3}**: low band numerator time constant
26. **Time constant T_{L4}**: low band numerator time constant
27. **Time constant T_{L5}**: low band numerator time constant
28. **Time constant T_{L6}**: low band numerator time constant
29. **Gain K_{L2}**: low band differential filter gain
30. **Coefficient K_{L17}**: low band first lead-lag block coefficient
31. **Time constant T_{L7}**: low band numerator time constant
32. **Time constant T_{L8}**: low band numerator time constant
33. **Time constant T_{L9}**: low band numerator time constant
34. **Time constant T_{L10}**: low band numerator time constant
35. **Time constant T_{L11}**: low band numerator time constant
36. **Time constant T_{L12}**: low band numerator time constant
37. **Low band upper limit V_{Lmax}**: low band upper limit
38. **Low band lower limit V_{Lmin}**: low band lower limit
39. **Gain K_I**: intermediate band gain
40. **Gain K_{I1}**: intermediate band differential filter gain
41. **Coefficient K_{I11}**: intermediate band first lead-lag block coefficient
42. **Time constant T_{I1}**: intermediate band numerator time constant
43. **Time constant T_{I2}**: intermediate band numerator time constant
44. **Time constant T_{I3}**: intermediate band numerator time constant
45. **Time constant T_{I4}**: intermediate band numerator time constant
46. **Time constant T_{I5}**: intermediate band numerator time constant
47. **Time constant T_{I6}**: intermediate band numerator time constant
48. **Gain K_{I2}**: intermediate band differential filter gain
49. **Coefficient K_{I17}**: intermediate band first lead-lag block coefficient
50. **Time constant T_{I7}**: intermediate band numerator time constant
51. **Time constant T_{I8}**: intermediate band numerator time constant
52. **Time constant T_{I9}**: intermediate band numerator time constant
53. **Time constant T_{I10}**: intermediate band numerator time constant
54. **Time constant T_{I11}**: intermediate band numerator time constant
55. **Time constant T_{I12}**: intermediate band numerator time constant
56. **Low band upper limit V_{Imax}**: intermediate band upper limit
57. **Low band lower limit V_{Imin}**: intermediate band lower limit
58. **Gain K_H**: high band gain
59. **Gain K_{H1}**: high band differential filter gain
60. **Coefficient K_{H11}**: high band first lead-lag block coefficient
61. **Time constant T_{H1}**: high band numerator time constant
62. **Time constant T_{H2}**: high band numerator time constant
63. **Time constant T_{H3}**: high band numerator time constant

64. **Time constant T_{H4}**: high band numerator time constant
65. **Time constant T_{H5}**: high band numerator time constant
66. **Time constant T_{H6}**: high band numerator time constant
67. **Gain K_{H2}**: high band differential filter gain
68. **Coefficient K_{H17}**: high band first lead-lag block coefficient
69. **Time constant T_{H7}**: high band numerator time constant
70. **Time constant T_{H8}**: high band numerator time constant
71. **Time constant T_{H9}**: high band numerator time constant
72. **Time constant T_{H10}**: high band numerator time constant
73. **Time constant T_{H11}**: high band numerator time constant
74. **Time constant T_{H12}**: high band numerator time constant
75. **Low band upper limit V_{Hmax}**: high band upper limit
76. **Low band lower limit V_{Hmin}**: high band lower limit
77. **Maximum PSS output V_{STMAX}**: maximum PSS output
78. **Minimum PSS output V_{STMIN}**: minimum PSS output
79. **Inertia constant H**: Inertia constant
80. **Filter frequency W_{n1}**: first notch filter frequency
81. **Filter bandwidth B_{W1}**: first notch filter 3 dB bandwidth
82. **Filter frequency W_{n2}**: second notch filter frequency
83. **Filter bandwidth B_{W2}**: second notch filter 3 dB bandwidth

2 Initial conditions

The initial output signal is zero from the steady-state solution.

3 References

[1] “IEEE Recommended Practice for Excitation System Models for Power System Models for Power System Stability Studies,” IEEE Standard 421.5-2016.