

Interval type-2-based thyristor controlled series capacitor to improve power system stability

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IT2 fuzzy control systems

- Any fuzzy logic system (FLS) is said to be a type-2 FLS when its inputs, antecedents and consequents are type-2 fuzzy sets. The output processor of a type-2 FLS consists of type-reduction followed by defuzzification.
- IT = IF and Then rules

Fig.3

- 5 level are used to define the fuzziness of the input variables.

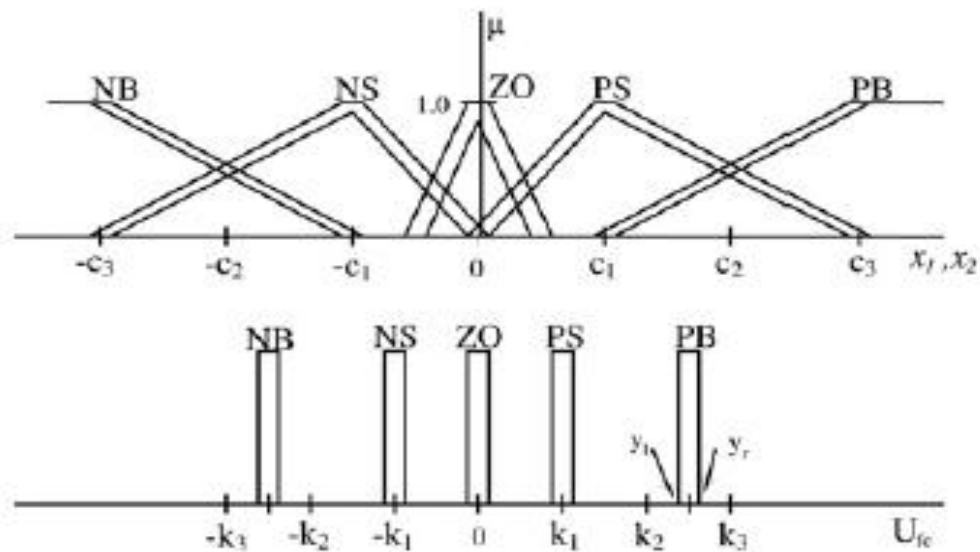


Fig. 3 Membership functions for both IF and THEN parts for normalised inputs

Variables

- $ee(k)$ = error + derivative
- $\Delta X_c(k)$ = The change in the capacitive line compensation (ΔX_c) in the line, where TCSC is connected, is derived by the IT2 fuzzy controller.

Table 1 Fuzzy inference rules

$ee(k)$	NB	NS	ZO	PS	PB
$\Delta X_c(k)$	PB	PS	ZO	NS	NB

IT2 fuzzy TCSC scheme(IT2TCSC).1

- PSS structure and its gain remaining unchanged with fixed gain lag-lead-based TCSCs are replaced with variable gain IT2TCSC. The control strategy adopted for the type-2 fuzzy control of TCSC (IT2TCSC).

The real power flow in the respective lines where the TCSCs are located

- α_1 and α_2 are both chosen arbitrarily at 0.9
- The limit of maximum change in the reactance is kept at 20%.

$$ee(k) = \alpha_1 * er(k) + \alpha_2 * ei(k)$$

IT2 fuzzy TCSC scheme(IT2TCSC).2

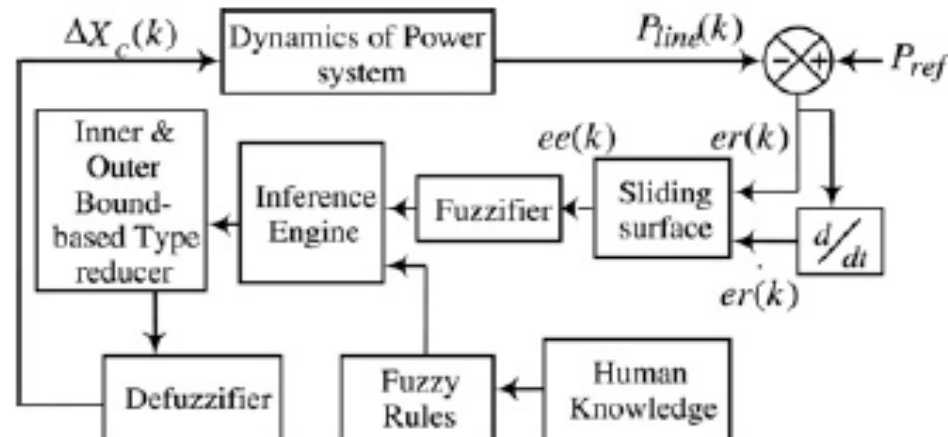


Fig. 5 IT2 fuzzy control scheme for TCSC