**Linguistic rules (pg 498)**

Rule i: If x is A, then f(x) is B, (I = 1,2,….,N)

Where x and f(x) are independent variables, and N the number of experimental data.

These rules are referred to as IF-THEN rules because of there form.

Antecedent – IF clause

Consequent – THEN clause

eg) If x is -2, then f(x) is 25/30

Four inputs:  
θ -Pole angle antecedent

θ̇ -Pole angle antecedent

-Distance from a set point antecedent

- Distance from a set point antecedent

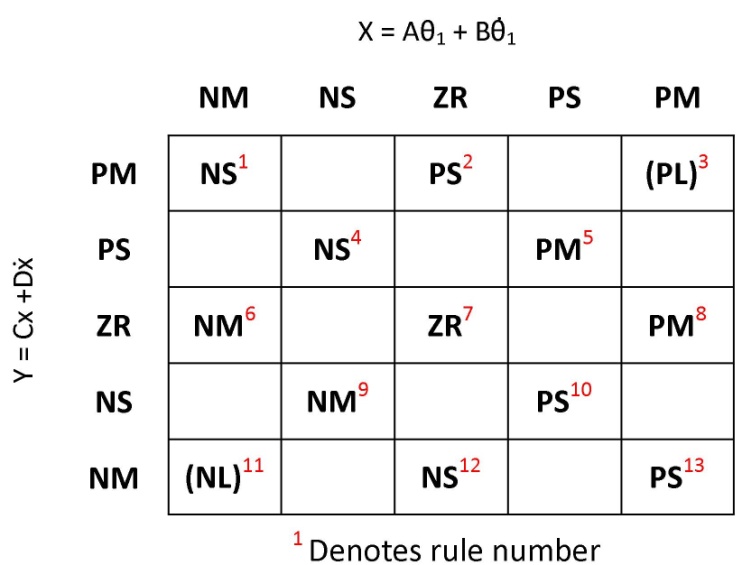
Reduction of fuzzy IF-THEN rules

Yamakawa states with four inputs (θ, θ̇, , ) used in the antecedent and five labels, there are 54 rules = 625 rules. He suggests reducing them to:

X = Aθ1 + Bθ̇1 -Measure of emergency in the angle

Y = C +D -Measure of emergency in the position

Thus, the above fuzzy rules can be reduced to just 11. Two rules to guard against strong disturbance are added (the two bracketed rules (NL) and (PL)). The completed rule map with assigned rules:



Rule set:

Rule1: If X is Negative Medium and Y is Positive Medium then output is Negative Small

Rule2: If X is Zero and Y is Positive Medium then output is Positive Small

Rule3: If X is Positive Medium and Y is Positive Medium then output is Positive Large

Rule4: If X is Negative Small and Y is Positive Small then output is Negative Small

Rule5: If X is Positive Small and Y is Positive Small then output is Positive Medium

Rule6: If X is Negative Medium and Y is Zero then output is Negative Medium

Rule7: If X is Zero and Y is Zero then output is Zero

Rule8: If X is Positive Medium and Y is Zero then output is Positive Medium

Rule9: If X is Negative Small and Y is Negative Small then output is Negative Medium

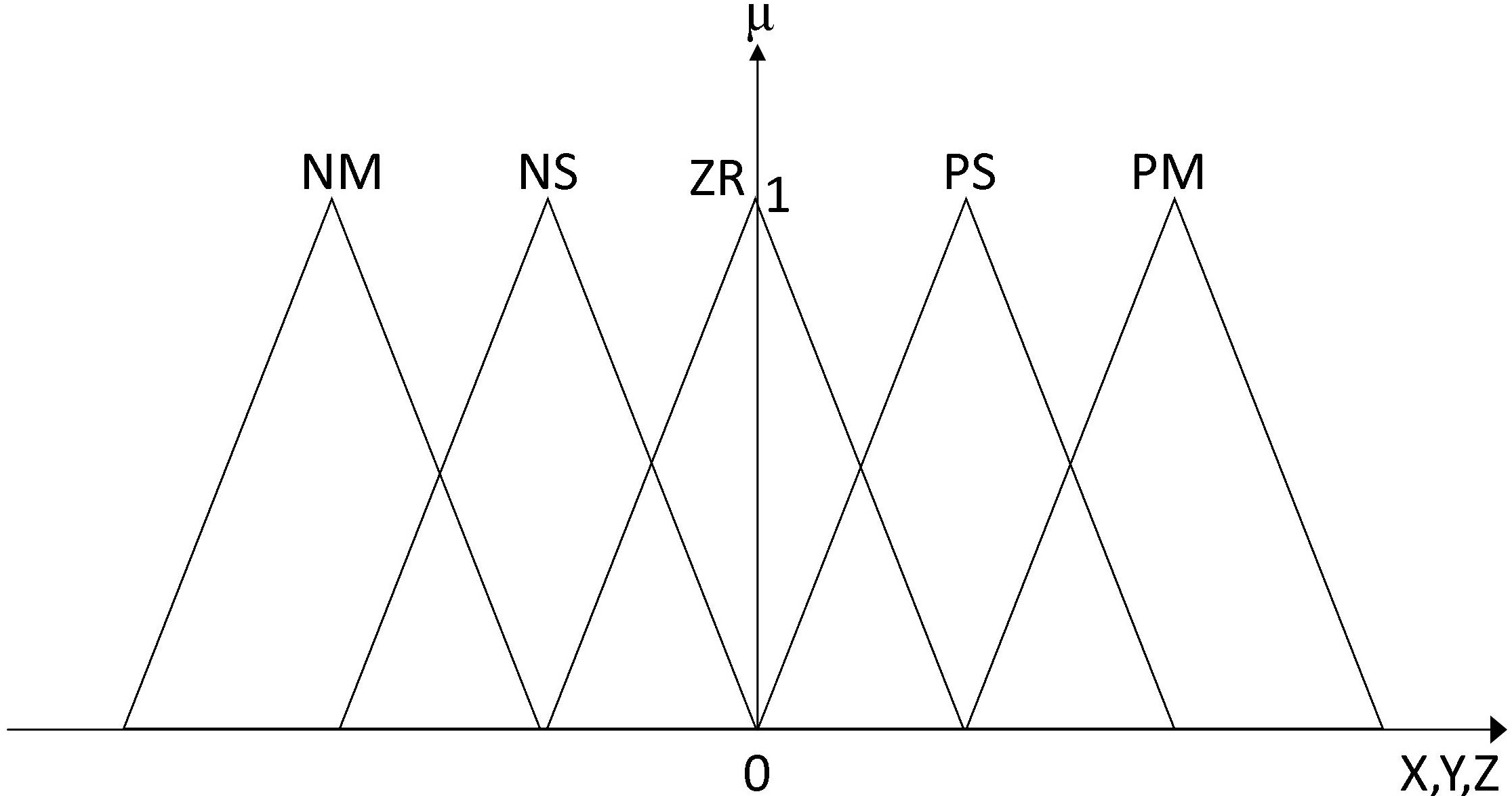
Rule10: If X is Positive Small and Y is Negative Small then output is Positive Small

Rule11: If X is Negative Medium and Y is Negative Medium then output is Negative Large

Rule12: If X is Zero and Y is Negative Medium then output is Negative Small

Rule13: If X is Positive Medium and Y is Negative Medium then output is Positive Small

Membership Functions



Excel representation

