ABSTRAK

Berdasar Teorema Dekomposisi, hasil operasi aritmetika bilangan kabur A dan B dengan potongan-α dari A dan B berturut-turut $A_\alpha = [a_\alpha^-, a_\alpha^+]$, dan $B_\alpha = [b_\alpha^-, b_\alpha^+]$, dapat didefinisikan sebagai bilangan kabur dengan potongan-α sebagai berikut:

a. $(A+B)_\alpha = [a_\alpha^- + b_\alpha^-, a_\alpha^+ + b_\alpha^+]$

b. $(A-B)_\alpha = [a_\alpha^- - b_\alpha^+, a_\alpha^+ - b_\alpha^-]$

c. $(A \cdot B)_\alpha = [\min(a_\alpha^- b_\alpha^-, a_\alpha^- b_\alpha^+, a_\alpha^+ b_\alpha^-, a_\alpha^+ b_\alpha^+),\ \text{maks}\ (a_\alpha^- b_\alpha^-, a_\alpha^- b_\alpha^+, a_\alpha^+ b_\alpha^-, a_\alpha^+ b_\alpha^+)]$

d. $(A/B)_\alpha = [\min(a_\alpha^- / b_\alpha^-, a_\alpha^- / b_\alpha^+, a_\alpha^+ / b_\alpha^-, a_\alpha^+ / b_\alpha^+), \text{maks}(a_\alpha^- / b_\alpha^-, a_\alpha^- / b_\alpha^+, a_\alpha^+ / b_\alpha^-, a_\alpha^+ / b_\alpha^+)]$

untuk setiap $\alpha \in [0,1]$.

Berdasar Prinsip Perluasan, hasil operasi aritmetika bilangan kabur A dan B dapat didefinisikan sebagai bilangan kabur dengan fungsi keanggotaan berturut-turut:

a. $\mu_{A+B}(z) = \sup\limits_{z=x+y} \min[\mu_A(x), \mu_B(y)]$

b. $\mu_{A-B}(z) = \sup\limits_{z=x-y} \min[\mu_A(x), \mu_B(y)]$

c. $\mu_{A \cdot B}(z) = \sup\limits_{z=x \cdot y} \min[\mu_A(x), \mu_B(y)]$

d. $\mu_{A/B}(z) = \sup\limits_{z=x/y} \min[\mu_A(x), \mu_B(y)]$

untuk setiap $z \in \mathbb{R}$.

Definisi operasi aritmetika bilangan kabur dengan menggunakan Prinsip Perluasan adalah ekivalen dengan definisi operasi aritmetika bilangan kabur dengan menggunakan potongan-α berdasarkan Teorema Dekomposisi.

ABSTRACT

Based on the Decomposition Theorem, the result of arithmetic operations of fuzzy numbers A and B with the α-cuts $A_\alpha = [a_\alpha^-, a_\alpha^+]$ and $B_\alpha = [b_\alpha^-, b_\alpha^+]$ respectively, can be defined as the fuzzy number with α-cut as follows:

a. $(A+B)_\alpha = [a_\alpha^- + b_\alpha^-, a_\alpha^+ + b_\alpha^+]$

b. $(A-B)_\alpha = [a_\alpha^- - b_\alpha^+, a_\alpha^+ - b_\alpha^-]$

c. $(A \cdot B)_\alpha = [\min(a_\alpha^- b_\alpha^-, a_\alpha^- b_\alpha^+, a_\alpha^+ b_\alpha^-, a_\alpha^+ b_\alpha^+), \text{ maks } (a_\alpha^- b_\alpha^-, a_\alpha^- b_\alpha^+, a_\alpha^+ b_\alpha^-, a_\alpha^+ b_\alpha^+)]$

d. $(A/B)_\alpha = [\min(a_\alpha^-/b_\alpha^-, a_\alpha^-/b_\alpha^+, a_\alpha^+/b_\alpha^-, a_\alpha^+/b_\alpha^+), \text{maks}(a_\alpha^-/b_\alpha^-, a_\alpha^-/b_\alpha^+, a_\alpha^+/b_\alpha^-, a_\alpha^+/b_\alpha^+)]$

for every $\alpha \in [0,1]$.

Based on the Extension Principle, the result of arithmetic operations of fuzzy numbers A and B can be defined as the fuzzy number with membership functions as follows:

a. $\mu_{A+B}(z) = \sup_{z=x+y} \min[\mu_A(x), \mu_B(y)]$

b. $\mu_{A-B}(z) = \sup_{z=x-y} \min[\mu_A(x), \mu_B(y)]$

c. $\mu_{A \cdot B}(z) = \sup_{z=x \cdot y} \min[\mu_A(x), \mu_B(y)]$

d. $\mu_{A/B}(z) = \sup_{z=x/y} \min[\mu_A(x), \mu_B(y)]$

for every $z \in \mathbb{R}$.

The definition of the arithmetic operation of fuzzy numbers using the Extension Principle is equivalent to the definition of the arithmetic operation of fuzzy numbers using α-cut based on the Decomposition Theorem.