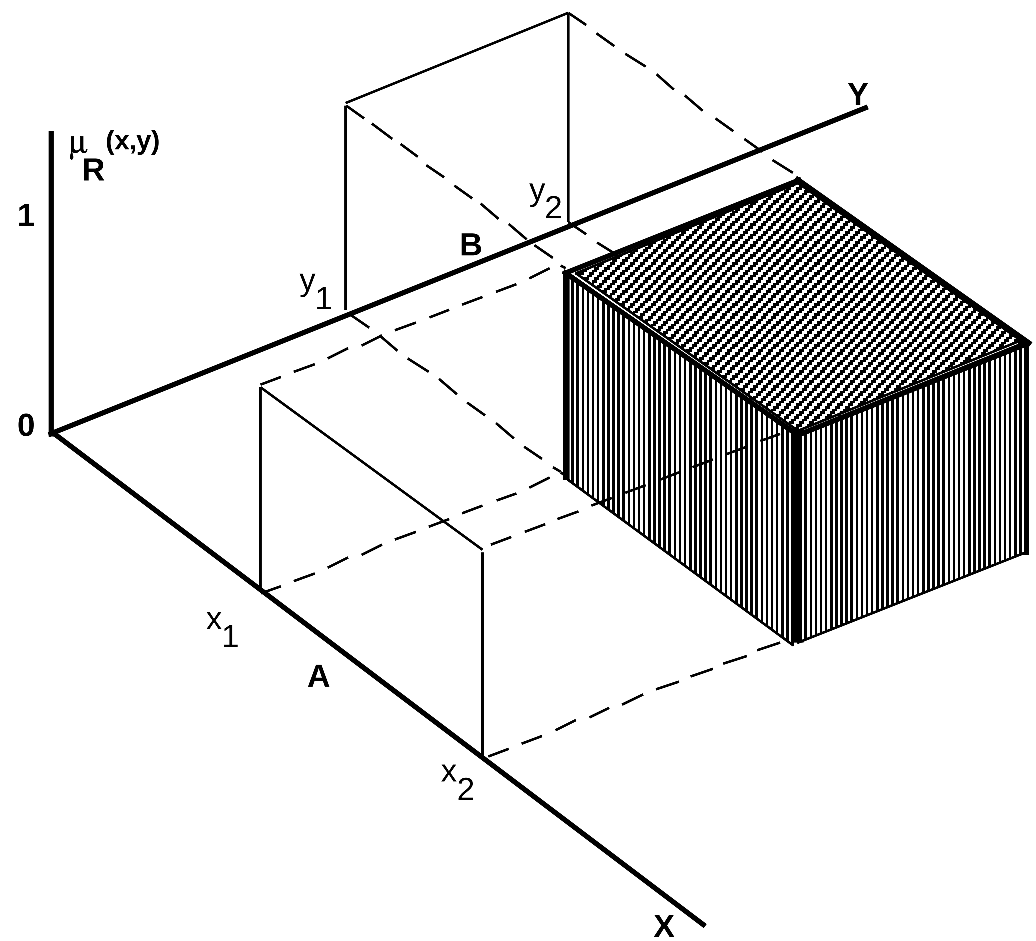
Boolean Mapping: Cartesian Product R(X,Y)

$$\mu_A(x) = \begin{cases} 1 & \text{if } x \in [x_1, x_2] \\ 0 & \text{otherwise} \end{cases}$$

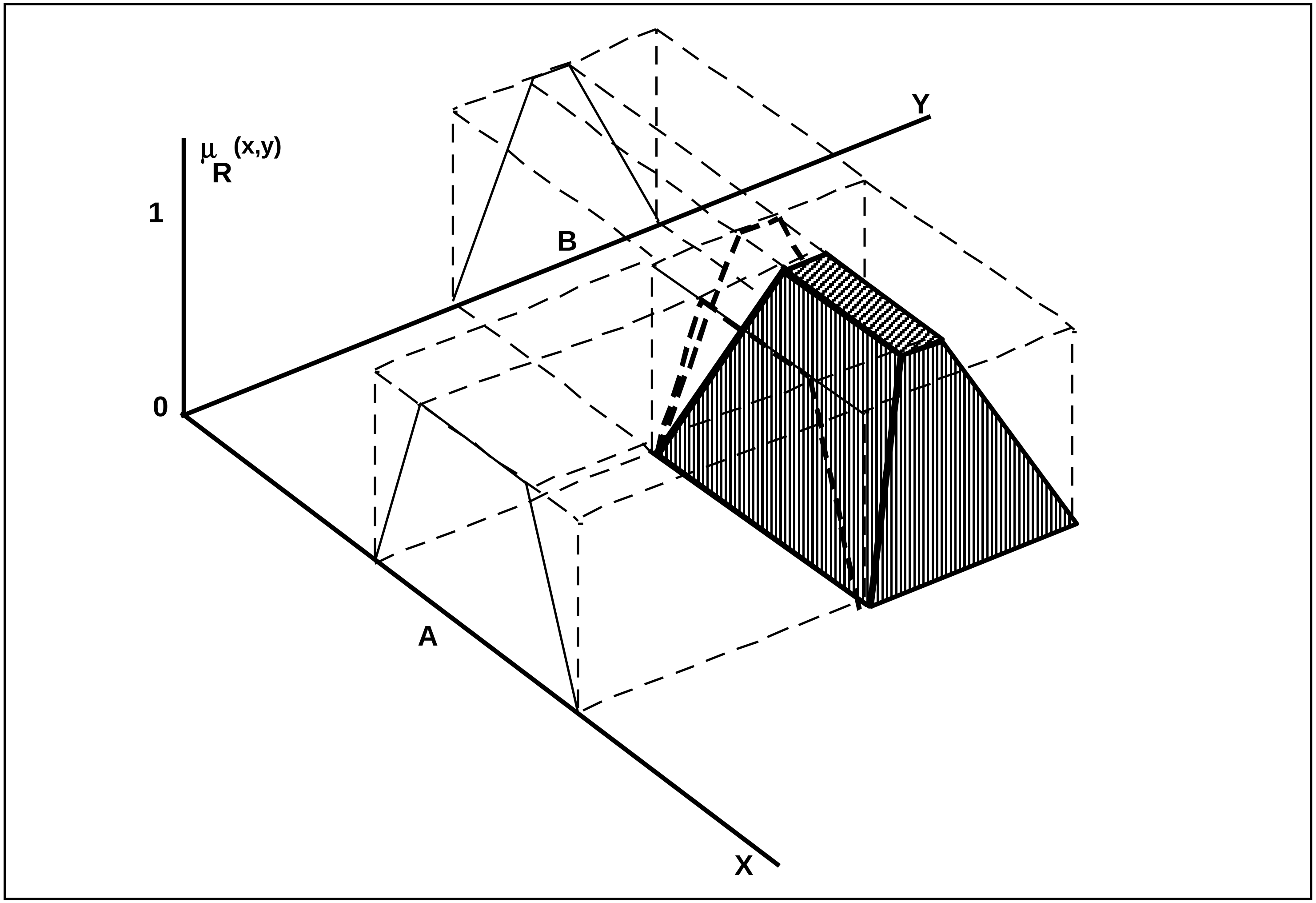
$$\mu_B(x) = \begin{cases} 1 & \text{if } y \in [y_1, y_2] \\ 0 & \text{otherwise} \end{cases}$$

$$\mu_R(x,y) = \begin{cases} 1 & \text{if } x \in [x_1, x_2] \text{ and } y \in [y_1, y_2] \\ 0 & \text{otherwise} \end{cases}$$

$$\mu_R(x,y) = \text{Min}\{\mu_A(x), \mu_B(y)\}$$

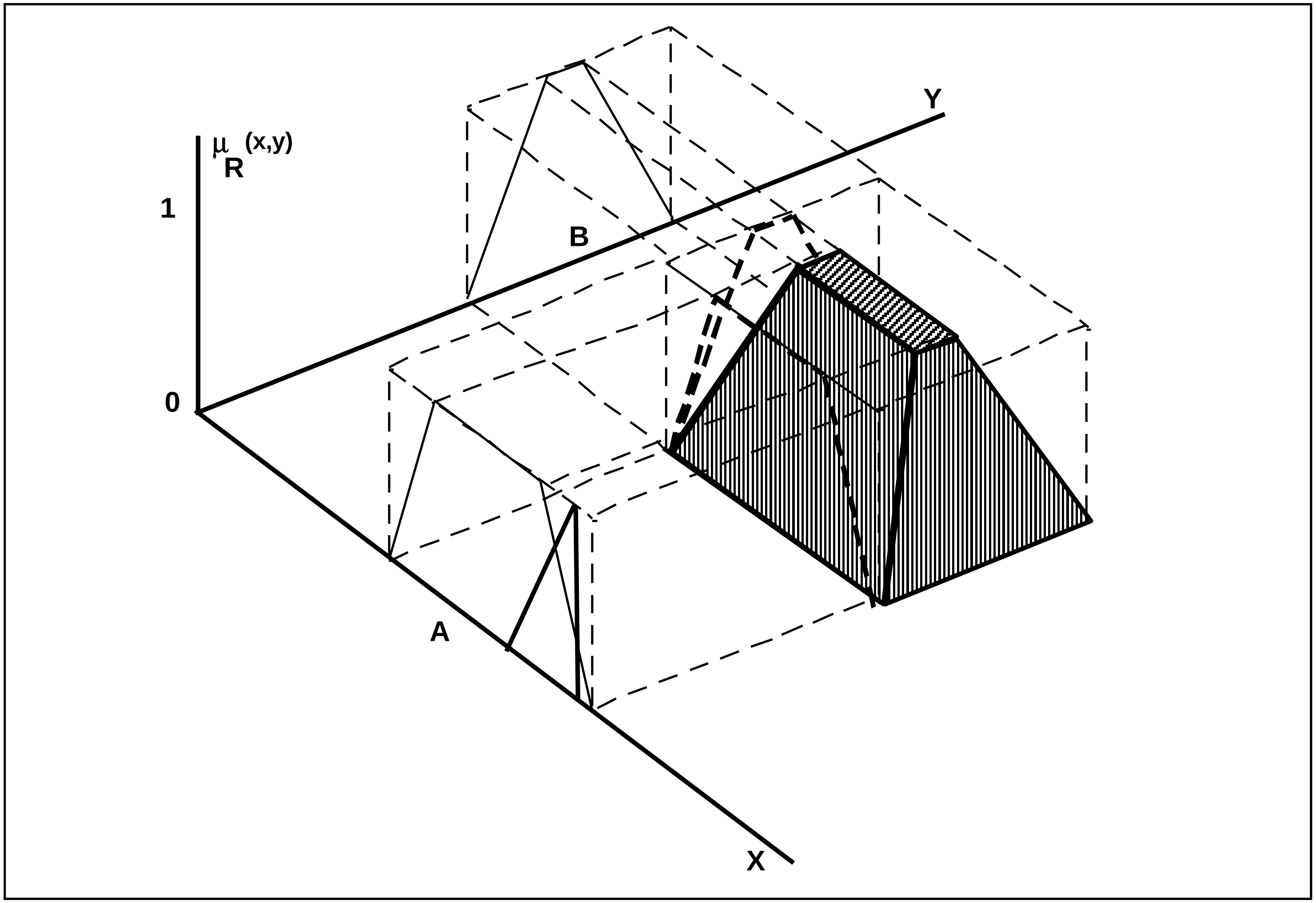


Fuzzy Mapping: Cartesian Product R(X,Y)



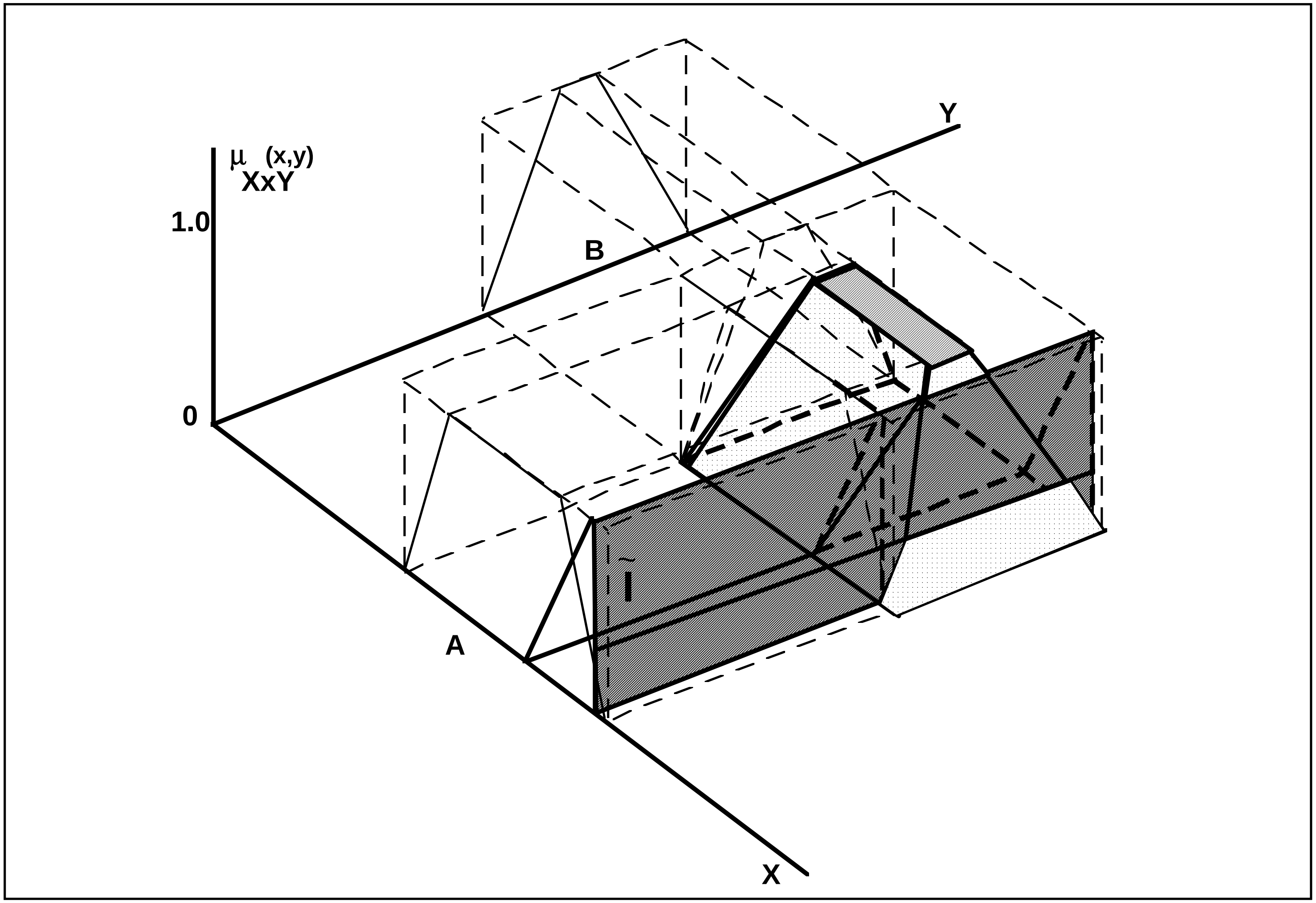
$$\mu_R(x,y) = \quad Min\{\mu_A(x), \mu_B(y)\}$$

Fuzzy Input



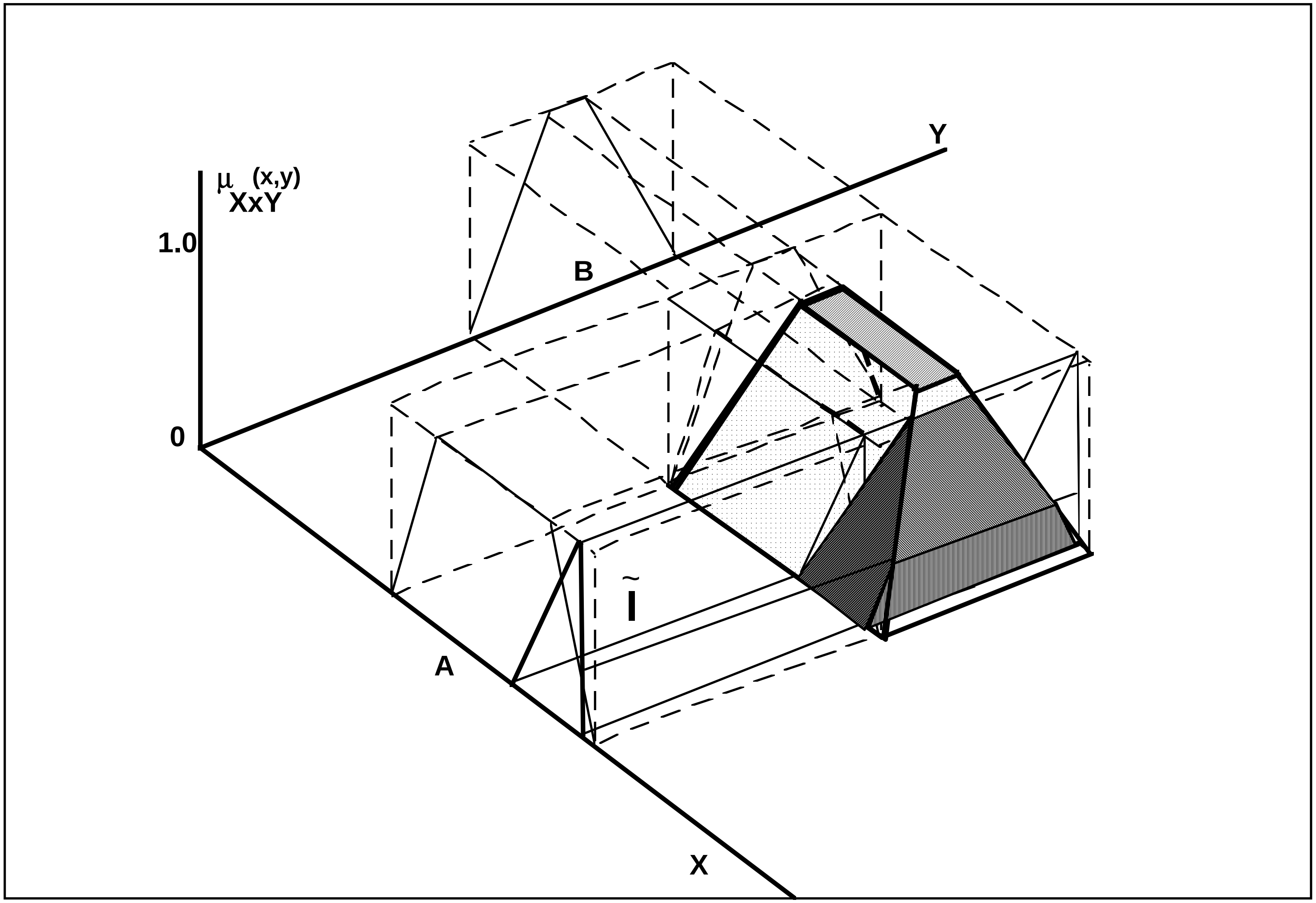
Fuzzy Input = $\mu_I(x)$

Input Cylindrical Extension



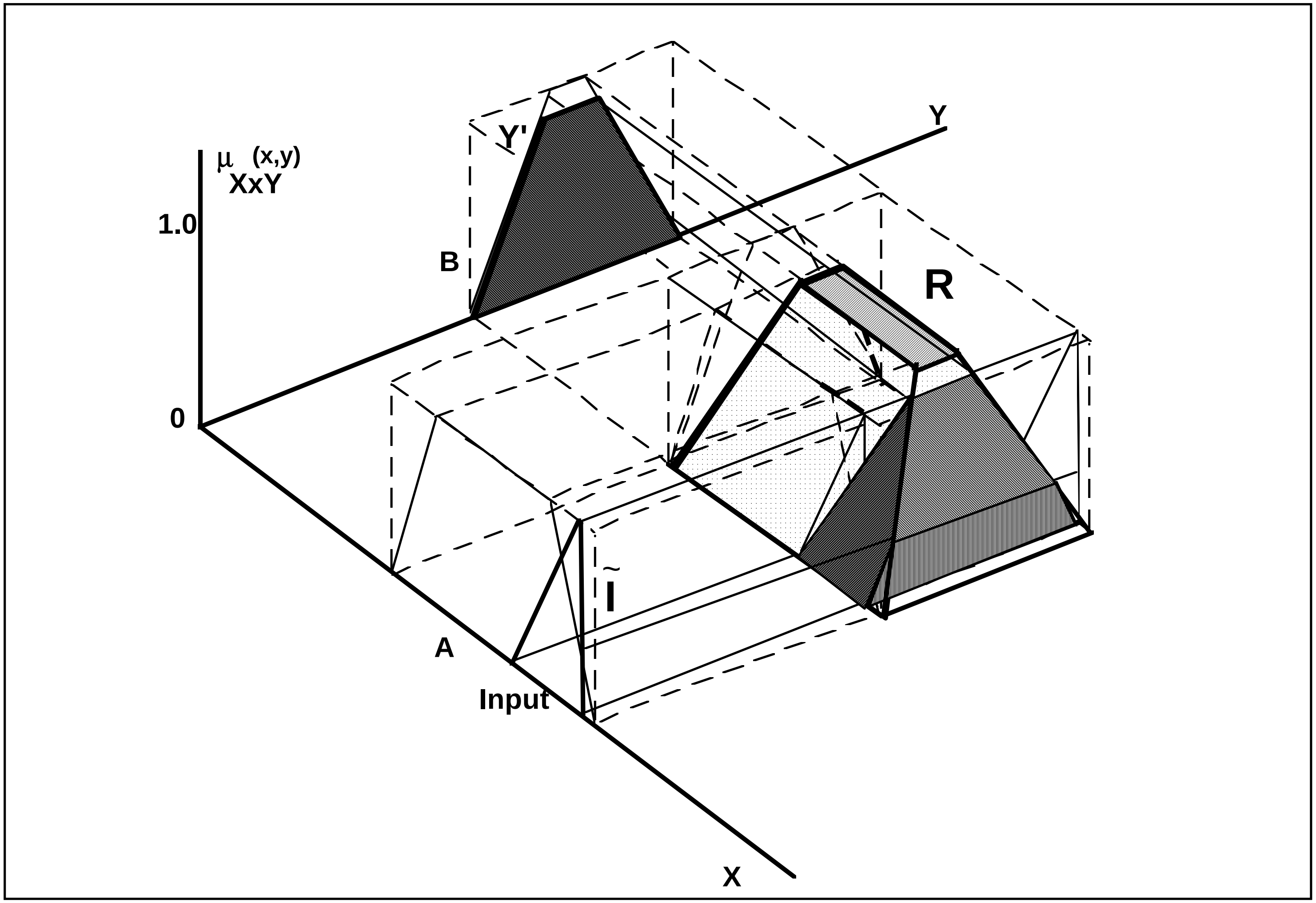
Fuzzy Input Cylindrical Extension= $\mu_{\tilde{I}}$ **(x,y)**

Intersection with Fuzzy Relation



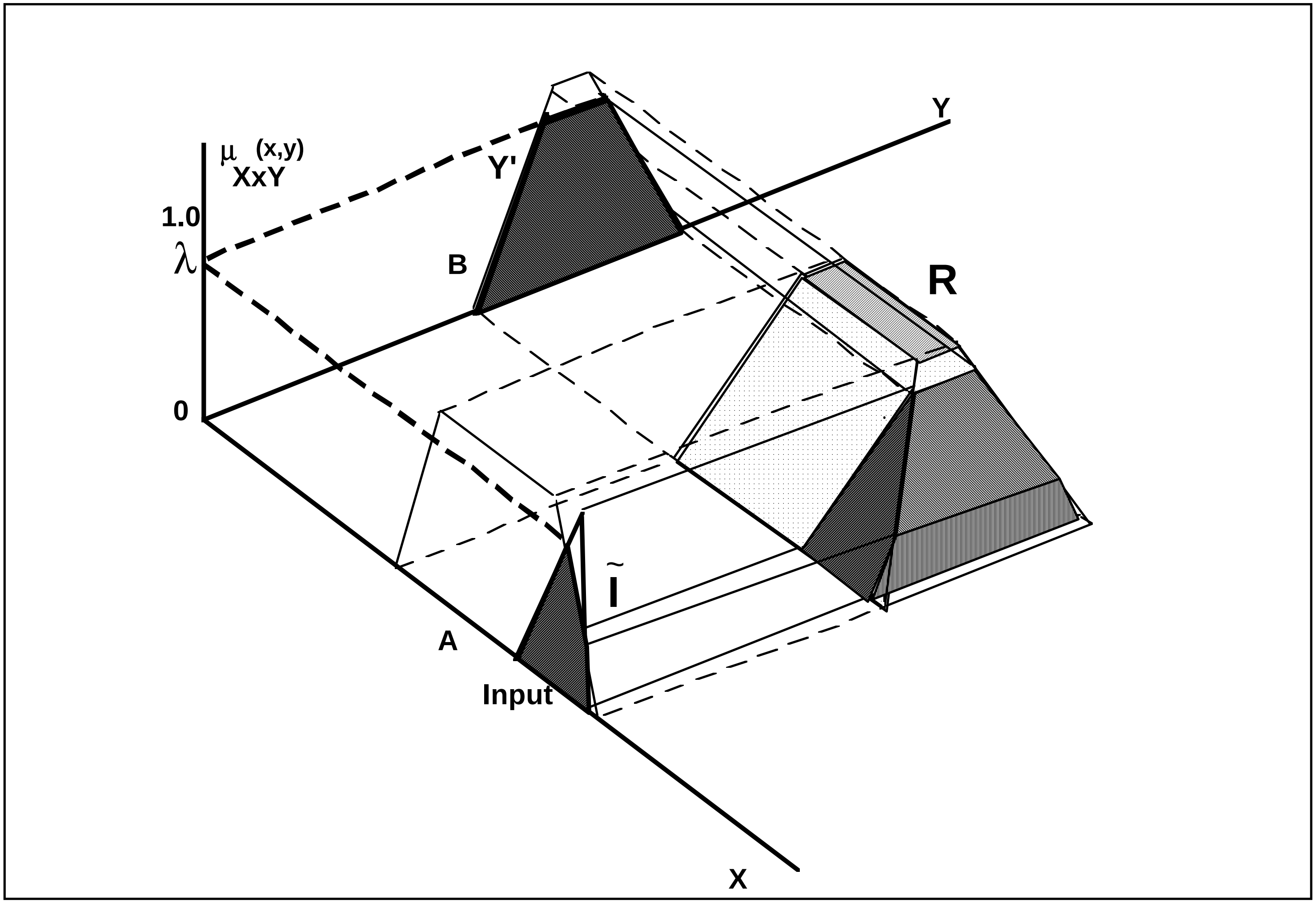
$$\text{Min}\{\mu_{\tilde{I}}(x,y), \mu_R(x,y)\}$$

Projection of Intersection



$$\mu_{Y'}(y) = \max_{x}\{ \min\{\mu_{\tilde{I}}(x,y), \mu_R(x,y)\} \}$$

Projection of Intersection- Alternative Method



$$\mu_{Y'}(y) = \text{MIN}\left\{ \overbrace{\underset{X}{\text{Max}}\{\text{Min}\{\mu_{I}(x),\mu_{A}(x)\}\}}^{\lambda},\ \mu_{B}(y) \right\}$$