$P \in R^{K_h \times K_w \times C_{in}} K_h K_w C_{in}$

$$F = Conv(K, P), \tag{1}$$

$K \in R^{K_h \times K_w \times C_{in} \times C_{out}} C_{out}$
$F \in R^{C_{out}}$
$c_{out} = \sum_i^{K_h \times K_w \times C_{in}} (K_{i,c_{out}} \times P_i)$.
$P_1 P_2 FP$
F_1
$F_2 F_1 =$
$Conv(K, P_1)$
$F_2 =$
$Conv(K, P_2)$
$P_1 P_2$
$P_1 P_2$
$_B = P_B P_S$
$m(P),$
$P_S =$
$P -$
$m(P),$
$m(P) P$
$K_h \times$
K_w
$P_B \in R^{1 \times 1 \times C_{in}} P_S \in R^{K_h \times K_w \times C_{in}}$
$K P_B$
$W_B \in R^1$
$W_S \in R^{K_h \times K_w \times K_h \times K_w \times C_{in}}$
P

$$F = ShapeConv(K, W_B, W_S, P) = Conv(K, W_B \diamond P_B + W_S * P_S) = Conv(K, \mathbf{P_B} + \mathbf{P_S}) = Conv((K, \mathbf{P_{BS}}), \tag{2}$$

$\diamond$
$*$

$$\{ \ P_{\mathbf{B}} = W_B \diamond P_B \mathbf{P_B}_{_{1,1,c_{in}}} = W_B \times P_{B_{1,1,c_{in}}}, \tag{3}$$

$$\{ \ P_{\mathbf{S}} = W_S * P_S \mathbf{P_S}_{_{k_h,k_w,c_{in}}} = \sum_i^{K_h \times K_w} (W_{S_{i,k_h,k_w,c_{in}}} \times P_{S_{i,c_{in}}}), \tag{4}$$

c_{in}
k_h
$k_w C_{in}$
K_h
K_w
$\mathbf{P_B}$
$\mathbf{P_S} \mathbf{P_{BS}} \mathbf{P_B}$
$\mathbf{P_S} K$
$\mathbf{P_{BS}}$
$\{ \ K_{\mathbf{B}} =$
$W_B \diamond$
K_B
$\mathbf{K_B}_{_{1,1,c_{in},c_{out}}} =$
$W_B \times$
$K_{B_{1,1,c_{in},c_{out}}},$
$\{ \ K_{\mathbf{S}} =$
$W_S *$
K_S
$\mathbf{K_S}_{_{k_h,k_w,c_{in},c_{out}}} =$
$\sum_i^{K_h \times K_w} (W_{S_{i,k_h,k_w,c_{in}}} \times$
$K_{S_{i,c_{in},c_{out}}})$,
$K_B \in R^{1 \times 1 \times C_{in} \times C_{out}}$
$K_S \in R^{K_h \times K_w \times C_{in} \times C_{out}} K =$
$K_B +$
K_S

$$F = ShapeConv(K, W_B, W_S, P) = Conv(W_B \diamond m(K) + W_S * (K - m(K)), P) = Conv(W_B \diamond K_B + W_S * K_S, P) = Conv(\mathbf{K_B} + \tag{5}$$