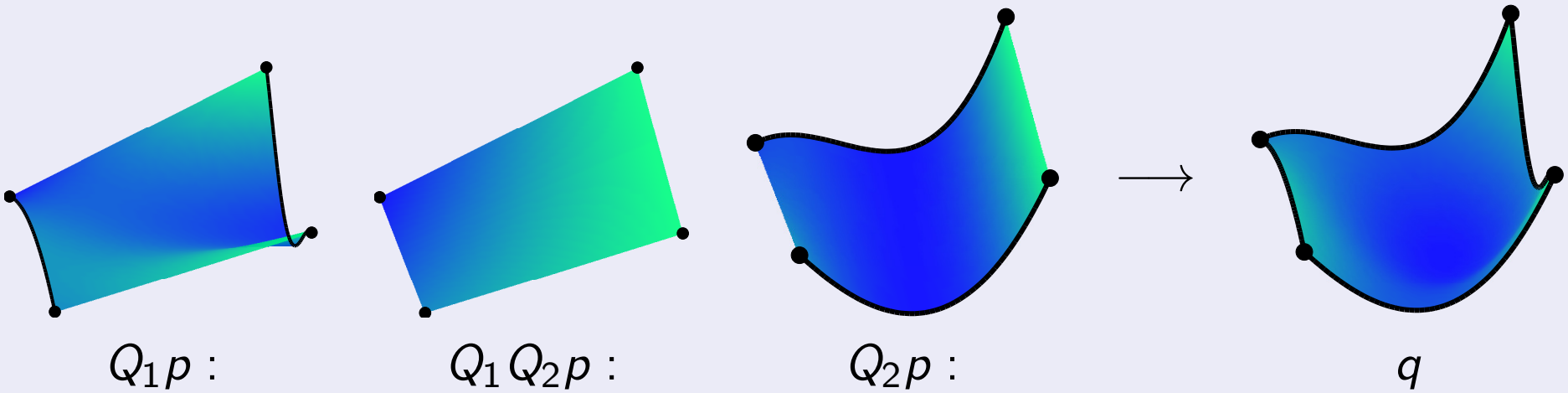
Coons Patches

Coons's method approximates a surface patch parametrized by

$$t \mapsto p(t_1, t_2), \quad 0 \leq t_\nu \leq 1\,,$$

by linearly interpolating its four boundary curves ($t_\nu = 0$ or $t_\nu = 1$).



$Q_1 p$: $Q_1 Q_2 p$: $Q_2 p$: q

Denoting by Q_ν the interpolation operator in the νth direction, the interpolating Coons patch has the parametrization

$$q = Q_1 p + Q_2 p - Q_1 Q_2 p\,.$$

More explicitly,

$$
\begin{aligned}
q(t_1,t_2) \;=\; & [(1-t_1)p(0,t_2)+t_1p(1,t_2)] \\
& +[(1-t_2)p(t_1,0)+t_2p(t_1,1)] \\
& -[\;\; (1-t_1)(1-t_2)p(0,0) \\
& \quad +(1-t_1)t_2p(0,1) \\
& \quad +t_1(1-t_2)p(1,0) \\
& \quad +t_1t_2p(1,1) \qquad\qquad]\;.
\end{aligned}
$$