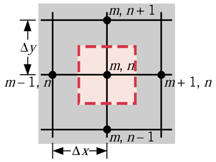
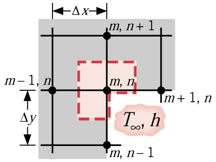
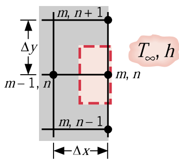
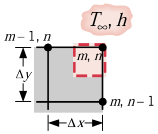
TABLE 5.3 Transient, two-dimensional finite-difference equations ($\Delta x = \Delta y$)

Configuration	(*a*) Explicit Method: Finite-Difference Equation	(*a*) Explicit Method: Stability Criterion	(*b*) Implicit Method
	$T_{m,n}^{p+1} = Fo(T_{m+1,n}^p + T_{m-1,n}^p + T_{m,n+1}^p + T_{m,n-1}^p) + (1 - 4Fo)\,T_{m,n}^p$ (5.76) 1. Interior node	$Fo \le \frac{1}{4}$ (5.80)	$(1 + 4Fo)\,T_{m,n}^{p+1} - Fo(T_{m+1,n}^{p+1} + T_{m-1,n}^{p+1} + T_{m,n+1}^{p+1} + T_{m,n-1}^{p+1}) = T_{m,n}^p$ (5.92)
	$T_{m,n}^{p+1} = \frac{2}{3}Fo(T_{m+1,n}^p + 2T_{m-1,n}^p + 2T_{m,n+1}^p + T_{m,n-1}^p + 2Bi\,T_\infty) + (1 - 4Fo - \frac{4}{3}Bi\,Fo)\,T_{m,n}^p$ (5.85) 2. Node at interior corner with convection	$Fo(3 + Bi) \le \frac{3}{4}$ (5.86)	$(1 + 4Fo(1 + \frac{1}{3}Bi))\,T_{m,n}^{p+1} - \frac{2}{3}Fo \cdot (T_{m+1,n}^{p+1} + 2T_{m-1,n}^{p+1} + 2T_{m,n+1}^{p+1} + T_{m,n-1}^{p+1}) = T_{m,n}^p + \frac{4}{3}Bi\,Fo\,T_\infty$ (5.95)
	$T_{m,n}^{p+1} = Fo(2T_{m-1,n}^p + T_{m,n+1}^p + T_{m,n-1}^p + 2Bi\,T_\infty) + (1 - 4Fo - 2Bi\,Fo)\,T_{m,n}^p$ (5.87) 3. Node at plane surface with convection[a]	$Fo(2 + Bi) \le \frac{1}{2}$ (5.88)	$(1 + 2Fo(2 + Bi))\,T_{m,n}^{p+1} - Fo(2T_{m-1,n}^{p+1} + T_{m,n+1}^{p+1} + T_{m,n-1}^{p+1}) = T_{m,n}^p + 2Bi\,Fo\,T_\infty$ (5.96)
	$T_{m,n}^{p+1} = 2Fo(T_{m-1,n}^p + T_{m,n-1}^p + 2Bi\,T_\infty) + (1 - 4Fo - 4Bi\,Fo)\,T_{m,n}^p$ (5.89) 4. Node at exterior corner with convection	$Fo(1 + Bi) \le \frac{1}{4}$ (5.90)	$(1 + 4Fo(1 + Bi))\,T_{m,n}^{p+1} - 2Fo(T_{m-1,n}^{p+1} + T_{m,n-1}^{p+1}) = T_{m,n}^p + 4Bi\,Fo\,T_\infty$ (5.97)

[a]To obtain the finite-difference equation and/or stability criterion for an adiabatic surface (or surface of symmetry), simply set *Bi* equal to zero.