Enačbe za single phase model

1 Polnjenje

1.1 1. Robni pogoj

$$\frac{k}{\Delta z^2}(T_1 - T_0) + \frac{h}{\Delta z}(T_f - T_0) = \frac{1}{2}\rho c_p \frac{T_0 - T_0^{k-1}}{\Delta t} + G c_p^f \frac{T_1 - T_0}{\Delta z}$$

Razčlenjeno

$$(2k\Delta t + 2h\Delta z\Delta t + \rho c_p \Delta z^2 - 2Gc_p^f \Delta z\Delta t)T_0 +$$
$$+(-2k\Delta t + 2Gc_p^f \Delta z\Delta t)T_1 = \rho c_p \Delta z^2 T_0^{k-1} + 2h\Delta z\Delta t T_f$$

1.2 Vmesne enačbe

$$k\frac{T_{i+1} - 2T_i + T_{i-1}}{\Delta z^2} = \rho c_p \frac{T_i - T_i^{k-1}}{\Delta t} + G c_p^f \frac{T_{i+1} - T_{i-1}}{2\Delta z}$$

Razčlenjeno

$$(-2k\Delta t - Gc_p^f \Delta z\Delta t)T_{i-1} + (4k\Delta t + 2\rho c_p \Delta z^2)T_i +$$
$$+(-2k\Delta t + Gc_p^f \Delta z\Delta t)T_{i+1} = 2\rho c_p \Delta z^2 T_i^{k-1}$$

1.3 2. Robni pogoj

$$\frac{k}{\Delta z^2}(T_{M-2} - T_{M-1}) = \frac{1}{2}\rho c_p \frac{T_{M-1} - T_{M-1}^{k-1}}{\Delta t} + G c_p^f \frac{T_{M-1} - T_{M-2}}{\Delta z}$$

Razčlenjeno

$$(-2k\Delta t - 2Gc_p^f \Delta z\Delta t)T_{M-2} + (2k\Delta + \rho c_p^f \Delta z^2 + 2Gc_p^f \Delta z\Delta t)T_{M-1} =$$
$$= \rho c_p \Delta z^2 T_{M-1}^{k-1}$$

2 Hranjenje

2.1 1. Robni pogoj

$$\frac{4k}{\Delta r^2}(T_1 - T_0) = \rho c_p \frac{T_0 - T_0^{k-1}}{\Delta t}$$

Razčlenjeno

$$(4k\Delta t + \rho c_p \Delta r^2)T_0 - 4k\Delta t T_1 = \rho c_p \Delta r^2 T_0^{k-1}$$

2.2 Vmesne enačbe brez točke na meji med hranilnikom in izolacijo

$$k\left(\frac{1}{r\Delta j}\frac{T_{j+1} - T_{j-1}}{2\Delta r} + \frac{T_{j+1} - 2T_j + T_{j-1}}{\Delta r^2}\right) = \rho c_p \frac{T_j - T_j^{k-1}}{\Delta t}$$

Razčlenjeno

$$(k\Delta t - 2k\Delta t j)T_{j-1} + (4k\Delta t j + 2\rho c_p \Delta r^2 j)T_j + (-k\Delta t - 2k\Delta t j)T_{j+1} =$$
$$= 2\rho c_p \Delta r^2 j T_j^{k-1}$$

2.3 Točka na meji

$$K = (N_M - \tfrac{3}{2})\rho_{hr} c_{hr} + (N_M - \tfrac{1}{2})\rho_{iz} c_{iz}$$
$$\frac{1}{2\Delta r^2 (N_{hr}-1)}(k_{iz}(T_M - T_{M-1}) + k_{hr}(T_{M-1} - T_{M-2})) + \frac{k_{iz}}{\Delta r^2}(T_M - T_{M-1}) -$$
$$-\frac{k_{hr}}{\Delta r^2}(T_{M-1} - T_{M-2}) = \frac{K}{2(N_M - 1)}\frac{T_{M-1} - T_{M-1}^{k-1}}{\Delta t}$$