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MODELING OF HORIZONTAL OIL WELL OPERATION IN THE STRATIFIED BED

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Key words: oil well, perforated hole, inflow profile, velocity profile, steady-state flow mode, numerical model, horizontal borehole, layered reservoir

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$$\Delta P_{j} = \frac{\mu}{4\pi k_{h}} \sum_{i=1}^{N} Q_{i} \sum_{n=-q_{i}}^{\infty} \int_{1}^{1} \left(\sqrt{\left(x_{j} - x_{i}\right)^{2} + \left(y_{j} - y_{i}\right)^{2} + \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}} \right)^{-1} + \left(\sqrt{\left(x_{j} - x_{i}\right)^{2} + \left(y_{j} - y_{i}\right)^{2} + \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}} \right)^{-1} - \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}}{\left(-0.5 \left(\sqrt{\left(x_{j} - x_{i}\right)^{2} + \left(y_{j} + y_{k}\right)^{2} + \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}} \right)^{-1} - \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}}{\left(-0.5 \left(\sqrt{\left(x_{j} - x_{i}\right)^{2} + \left(y_{j} - y_{k}\right)^{2} + \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}} \right)^{-1} - \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}}{\left(-0.5 \left(\sqrt{\left(x_{j} - x_{i}\right)^{2} + \left(y_{j} - y_{k}\right)^{2} + \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}} \right)^{-1} - \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}}{\left(-0.5 \left(\sqrt{\left(x_{j} - x_{i}\right)^{2} + \left(y_{j} - y_{k}\right)^{2} + \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}} \right)^{-1} - \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}}{\left(-0.5 \left(\sqrt{\left(x_{j} - x_{i}\right)^{2} + \left(y_{j} - y_{k}\right)^{2} + \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}} \right)^{-1} - \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}}{\left(-0.5 \left(\sqrt{\left(x_{j} - x_{i}\right)^{2} + \left(y_{j} - y_{k}\right)^{2} + \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}} \right)^{-1} - \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}}{\left(-0.5 \left(\sqrt{\left(x_{j} - x_{i}\right)^{2} + \left(y_{j} - y_{k}\right)^{2} + \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}} \right)^{-1} - \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{i} + 2nh\right)^{2}}{\left(z_{j} - z_{i} + 2nh\right)^{2}} \right)^{-1}} - \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{j} + 2nh\right)^{2}}{\left(z_{j} - z_{j} + 2nh\right)^{2}} \left(z_{j} - z_{j} + 2nh\right)^{2}} \right)^{-1}} - \frac{1}{\sqrt{k_{h}/k_{v}}} \left(z_{j} - z_{j} + 2nh\right)^{2}}{\left(z_{j} - z_{j} + 2nh\right)^{2}} \left(z_{j} - z_{j} - 2nh\right)^{2}} \left(z_{j} - z_{j} - 2nh\right)^{2}} \left(z_{j} - 2nh\right)^{2}} \left(z_{j} - 2nh\right)^{2} \left(z_{$$

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$$\begin{pmatrix}
-0.5 \\
\sqrt{(x_j - x_i)^2 + (y_j - y_{ki})^2} + \frac{1}{\sqrt{k_h/k_v}} (z_j + z_i + 2nh)^2 \\
\downarrow) \\
Q_i - \\
, '; k_h - \\
; h - \\
, ; x_i, y_i, z_i - \\
, ; y_{ki} = y_i + R_k - \\
\end{pmatrix}, i = \frac{1}{\sqrt{k_h/k_v}} (z_j + z_i + 2nh)^2 \\
\downarrow) \\
\downarrow , i = \frac{1}{\sqrt{k_h/k_v}} (z_j + z_i + 2nh)^2 \\
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$$R_k$$
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 Q_i

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$$\Delta P_{j} = \Delta P - \frac{\rho}{2} (V^{2} - V_{j}^{2}) - \sum_{k=1}^{j} \rho g (h + h)_{k}, \qquad (3)$$

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k, .
(2) (3)

$$\sum_{i=1}^{N} Q_{i} S_{ij} = \Delta P - \frac{\rho}{2} (V^{2} - V_{j}^{2}) - \sum_{k=1}^{j} \rho g(h + h)_{k} .$$
(4)
(4)

 Q_i .

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$$\Delta P_{j}^{m} = \sum_{i=1}^{N_{1}} Q_{i} S_{ij}^{m} + \sum_{i=1}^{N_{2}} Q_{i} S_{ij}^{m} + \dots + \sum_{i=1}^{N_{k}} Q_{i} S_{ij}^{m} , \qquad (5)$$

$$N_{1}, N_{2}, \dots, N_{k} - k^{-}$$

$$S_{ij}^{m}$$
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(5)
(4).
Q_i.

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	10		./	
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	261			
2	12			
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	7	7	12	./
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3		23		
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	5	10	5	./
	0,2			
	63			154
1	30			
	4			
	10			
	20			

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1	50	
2	30,5	
	12	
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	100	
	10	



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