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# بهینه سازی تولید میادین نفتی با استفاده از الگوریتم ژنتیکی

محسن توکلیان

فرهنگ جلالی فراهانی

fjlali@ut.ac.ir

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چکیده

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) MATLAB

Prosper

واژه های کلیدی:

مقدمه

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Polytope [ ] Palke et al. (1998) [ ] Aronofsky and Lee (1958) .

Gas Lift

Yan Pan et al. (1999) . [ ] (1962)

(Least [ ]

Squares)

[ ] Attra et al. (1961) .

الگوریتم ژنتیکی (GA)

GA

[ ] O'Dell et al. (1973)

[ ] Huppler (1979) .

[ ] Wattenbarger (1970)

[ ] Rosenwald and Green (1974)

[ ] Murray and Edgar (1978)

[ ] Zakirov and Kolbikov (1982)

(Material Balance)

GA [ ] Lea and Brown (1986)

Nodal Analysis

Fujii and Horne (1995) .

(GA) Polytope [ ]

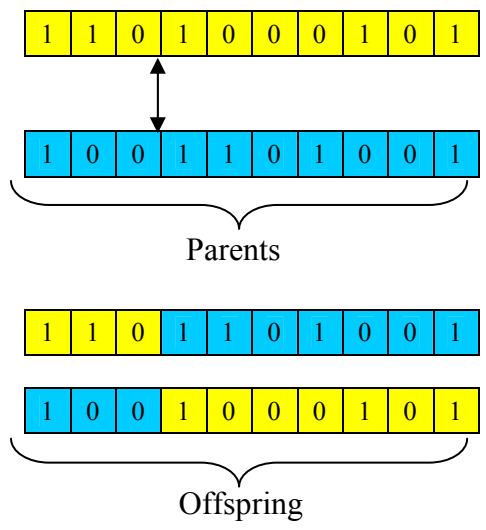
Carroll and Horne .

Finite Polytope [ ] (1992)

Difference

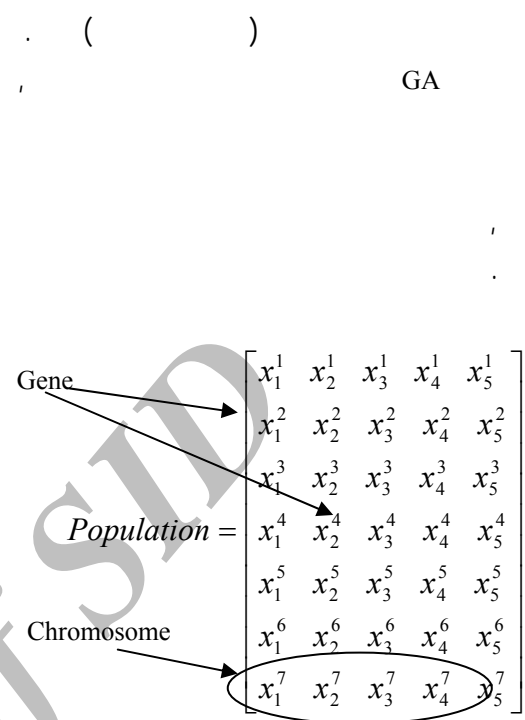
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شکل ۲: عمل لقاح در سیستم دودویی.

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شکل ۱: جمعیت و اجزای تشکیل دهنده آن در سیستم حقیقی.

$$\mathbf{v}'_1 = \mathbf{v}_1 + (1-\lambda)\mathbf{v}_2$$

$$\mathbf{v}'_2 = \mathbf{v}_2 + (1-\lambda)\mathbf{v}_1$$

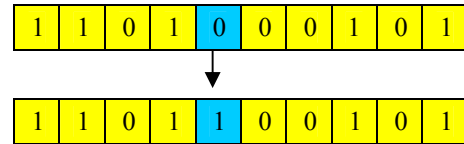
$$\lambda \begin{bmatrix} \mathbf{v}_2 & \mathbf{v}_1 \\ \mathbf{v}'_2 & \mathbf{v}'_1 \end{bmatrix} \quad ( )$$

$P_m$

$P_c$

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شکل ۳: عمل جهش در سیستم دودویی.

( ) : [ ]

$$x'_k = x_k + \Delta(t, x_k^U - x_k) \quad (1)$$

$$x'_k = x_k - \Delta(t, x_k - x_k^L) \quad (2)$$

### جریان عمودی سیال (مدل لوله مغزی)

$t$  (  $k$  )  $x_k^L$   $x_k^U$   
 $\Delta(t, y)$

: [ ]

$$\Delta(t, y) = y.r.\left(1 - \frac{t}{T}\right) \quad (3)$$

Aziz, Govier, and Fogarasi (AGF)

$T$  ( , )

$r$

( [ ] )

:(Sorting)

### ساخت مدل

(AGF)

$$N_x = V_{SG} \left( \frac{\rho_G}{0.0764} \right)^{1/3} \left( \frac{72 \rho_L}{62.4 \sigma_L} \right)^{1/4} \quad (4)$$

$$N_y = V_{SL} \left( \frac{72 \rho_L}{62.4 \sigma_L} \right)^{1/4} \quad (5)$$

$N_y$   $N_x$   
AGF

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[ ] ( / ) ( ) flash

AGF

AGF

Sachdeva, Schmidt, Brill,

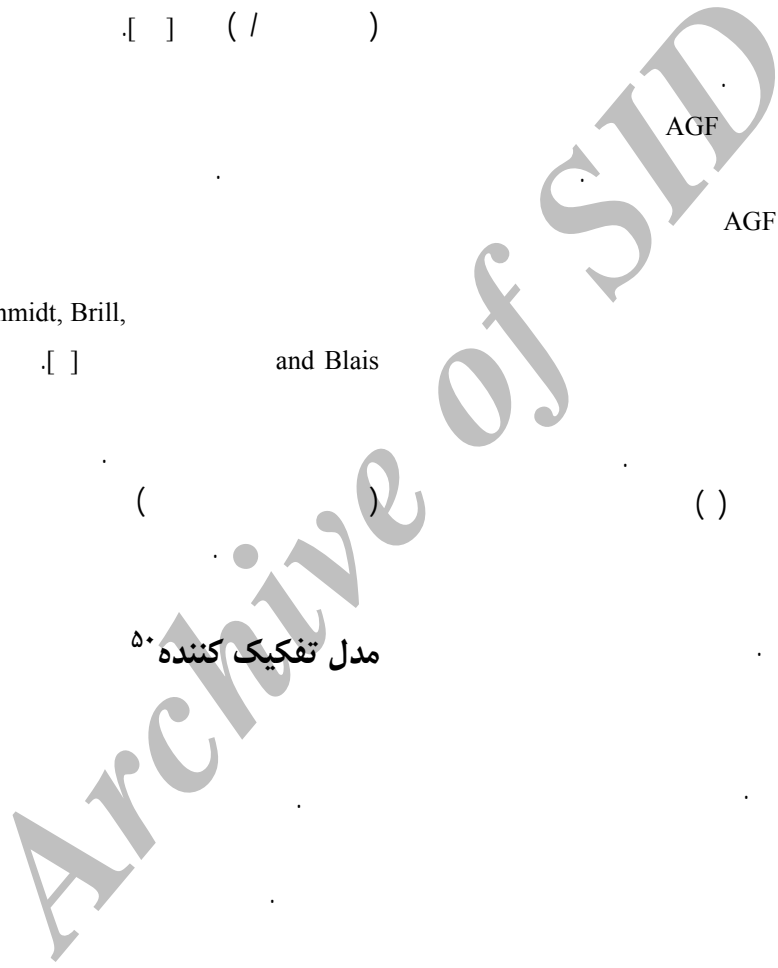
[ ] and Blais

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مدل تفکیک کننده ۵۰

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مدل کاهنده ۴۶



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GOR

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°API

$B_o$

### روش بهینه سازی

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$N_{wh}$  Z

$P_{sep1}$

Z

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$L_1$

$N_{wh}(1 - L_1)$

$y_1$

$N_{wh}L_1$

$x_1$

( )

$P_{sep2}$   $x_1$

(

$L_2$

$x_2$

$y_2$

$N_{wh}L_1L_2$

$N_{wh}L_1(1 - L_2)$

( )

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( )

$x_2$

(

(

)

$T_{atm}$

$P_{atm}$

(GOR

)

$L_{st}$

API

$X_{st}$

$N_{wh}L_1L_2L_{st}$

MATLAB

(

$N_{wh}(1 - L_1) + N_{wh}L_1(1 - L_2)$

:

GOR

°API GOR ( ) .

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نتایج

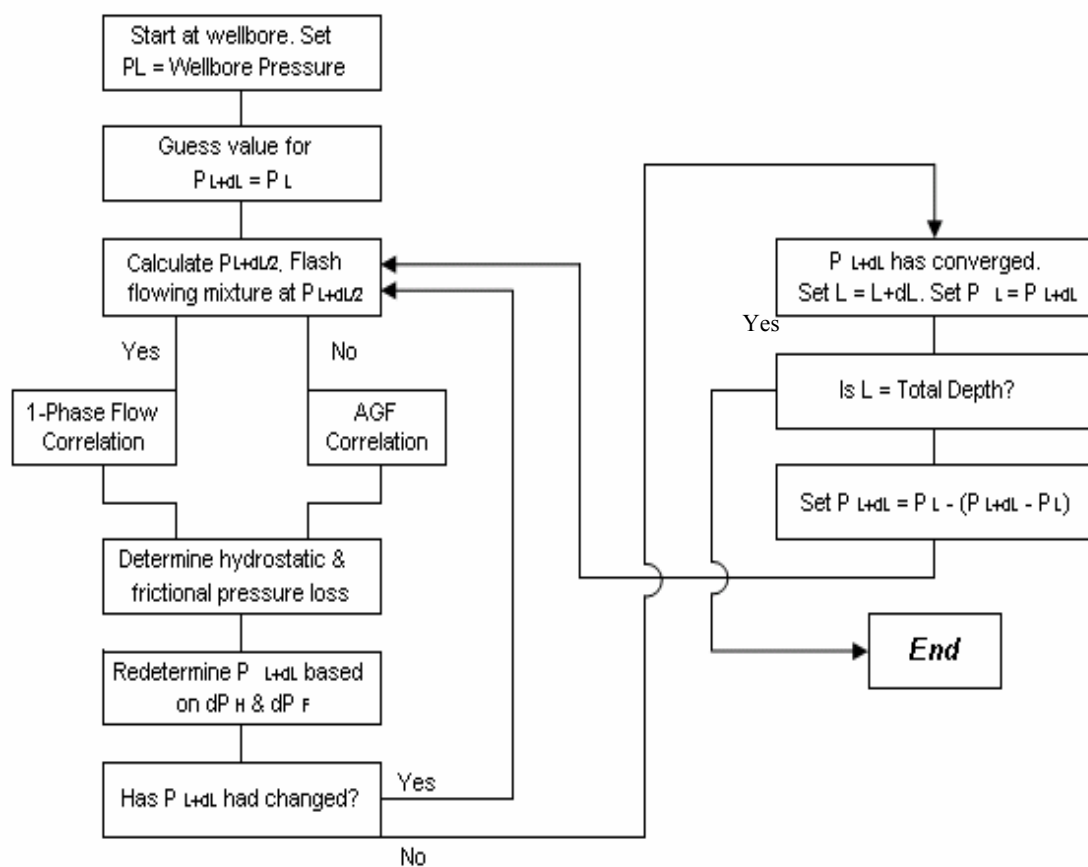
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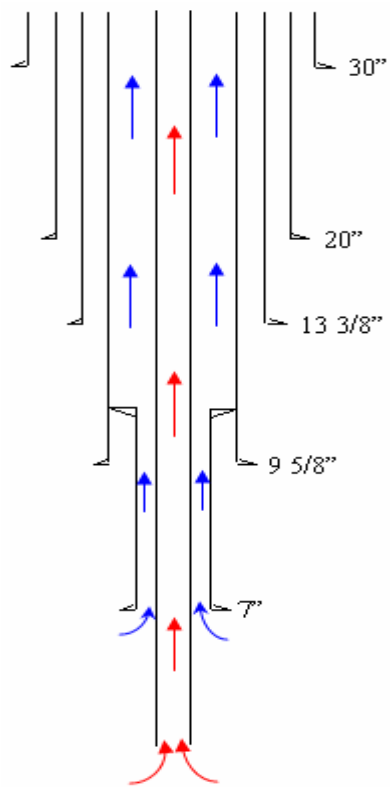
### تقدير و تشکر

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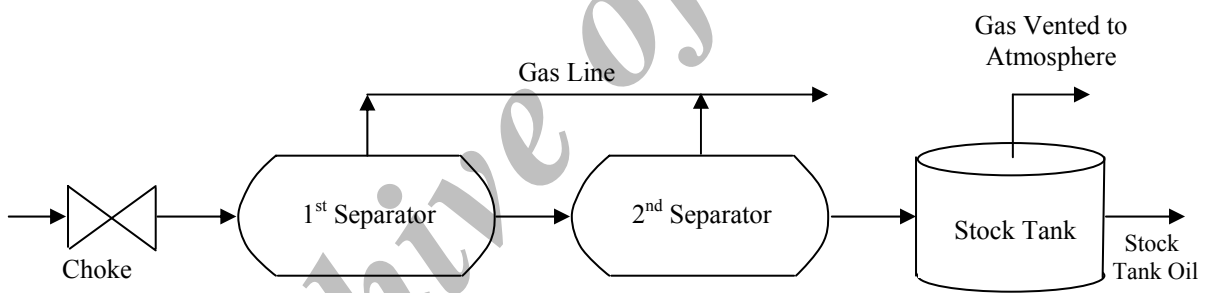


شکل ۴: رویه مورد استفاده برای تعیین توزیع فشار در لوله مغزی.

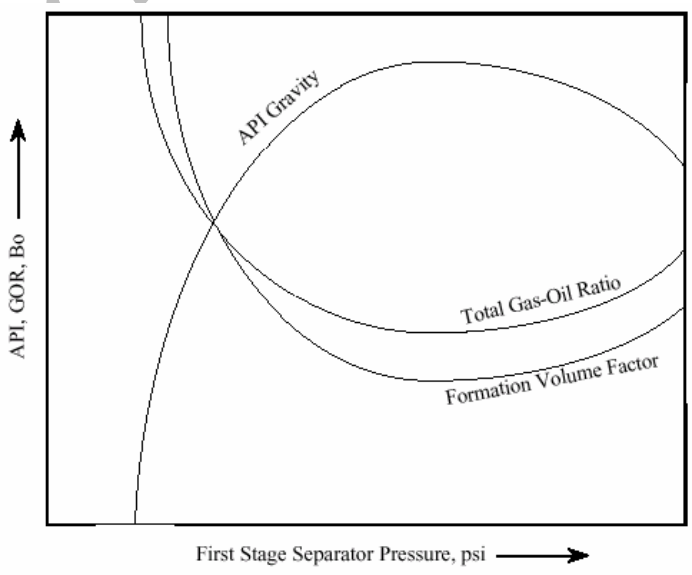




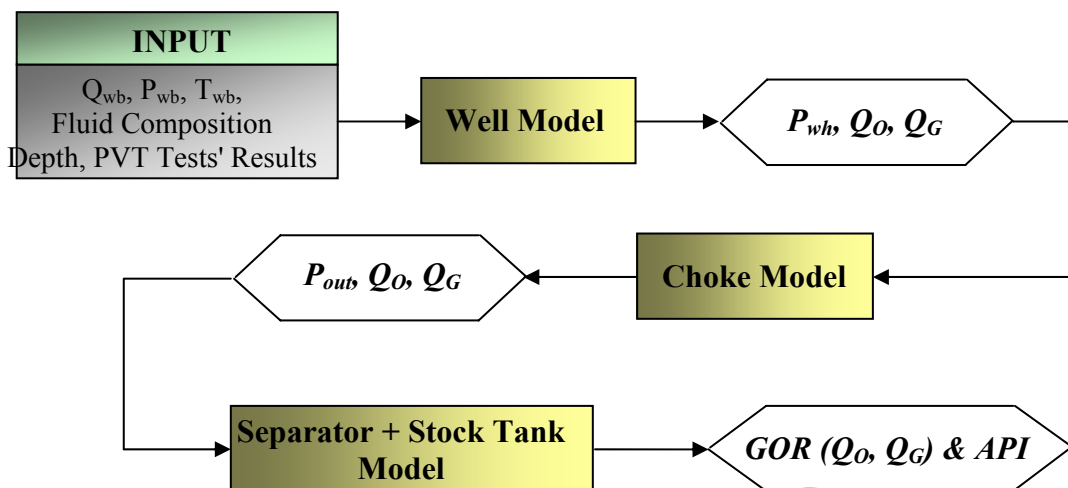
شکل ۵: نمائی از لوله مغزی با سایز دو گانه.



شکل ۶: مراحل تفکیک نفت و گاز پس از عبور از کاهنده.



شکل ۷: اثر فشار تفکیک کننده در کیفیت نفت خروجی.



شکل ۸: مدل کامل طراحی شده در نرم افزار.

جدول ۱: مقایسه نتایج نرم افزارهای شبیه ساز با نتایج برنامه نوشته شده.

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### واژه های انگلیسی به ترتیب استفاده در متن

- |                              |                               |                                |
|------------------------------|-------------------------------|--------------------------------|
| 1 - Stochastic               | 2 - Performance               | 3 - Reservoir Characterization |
| 4 - Gas Lift                 | 5 - Water Flooding            | 6 - Linear Optimization        |
| 7 - Nonlinear Optimization   | 8 - Stochastic                | 9 - Population                 |
| 10 - Chromosome              | 11 - Generations              | 12 - Fitness                   |
| 13 - Evaluation              | 14 - Offspring                | 15 - Crossover                 |
| 16 - Parent                  | 17 - Mutation                 | 18 - Selection                 |
| 19 - Optimum                 | 20 - Objective Function       | 21 - Penalty Functions         |
| 22 - Gene                    | 23 - Binary                   | 24 - Encode                    |
| 25 - Decode                  | 26 - Probability of Crossover | 27 - Random Cut-Point          |
| 28 - Local Optima            | 29 - Global Optima            | 30 - Maximization              |
| 31 - Minimization            | 32 - Tubing                   | 33 - Choke                     |
| 34 - Separators              | 35 - Critical                 | 36 - Subcritical               |
| 37 - Stock Tank              | 38 - Bubble                   | 39 - Slug                      |
| 40 - Transition              | 41 - Annular-Mist             | 42 - Wellbore Pressure         |
| 43 - Step                    | 44 - Liquid Holdup            | 45 - Wellhead                  |
| 46 - Choke Model             | 47 - Back Pressure            | 48 - Slugging                  |
| 49 - Critical Flow           | 50 - Separator Model          | 51 - Flare                     |
| 52 - Differential Liberation | 53 - Flash Calculation        | 54 - Gas Oil Ratio             |
| 55 - Liner Shoe              | 56 - Total Depth              |                                |