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Problems for experimental measuring hydraulic parameters of pipelines with closely-spaced joint welds and those for pneumatic transport of bulk material at an elevated pressure of the carrying gas are examined. Benches for studying and the results obtained for measuring hydraulic parameters to develop full-scale engineering systems are examined. Dependencies of an elevated hydraulic resistance on weld sizes and a relative space between them the bench for studying the effects of closely-spaced joint welds are reported using the bench for studying the effects of closely-spaced joint welds. The results for measuring a hydraulic resistance, a critical speed and specific power consumption for transporting dispersive two-phase gas suspensions in a previously unknown domain of working pressures are obtained using the pneumatic transport bench.

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10 – 12 , -

. . . . 4 – 5

1700 ,

© . . . , . . . , 2015

. – 2015. – 4.

10 %,

10 - 11 . 8-

( 7,5 ) ( )

( ) .

( ) ( )

150 ,

[1],

. 1.



.1

40

10

( )

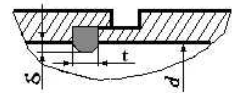
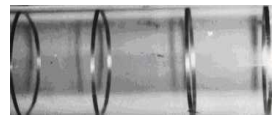
$6 \cdot 10^5$

:

$d = 148$

$d = 145$

.2.



$\delta = 0,8$   
 $t = 7$  ( .2, ).

.2

36

( .2, ).

-0,32 1,01

0,27 ; 0,52 1,01

1,1 7,7  
 145  
 [2]  
 0,35 ± 0,01  
 . 2, .

[3, 4],  $\bar{\delta} = \delta/d$ , 1,5

$\bar{l} = l/d$ ,  $l$  — ,  $d$  — ,  $\delta$  —

$$\Delta\lambda = \lambda' - \lambda = k_0 \frac{\bar{\delta}^{1,5}}{\bar{l}}; \Delta\bar{\lambda} = \frac{\Delta\lambda}{\lambda} 100\%, \quad (1)$$

$\lambda' - \lambda - k_0$   
 [5, 6].

$k_0 = 8,26$ ,  $k_0$  :  $k_0 = 4,14$ .

$\Delta\lambda$   
 . 3,

( 1 2)  $\bar{l} = 1,1$ .

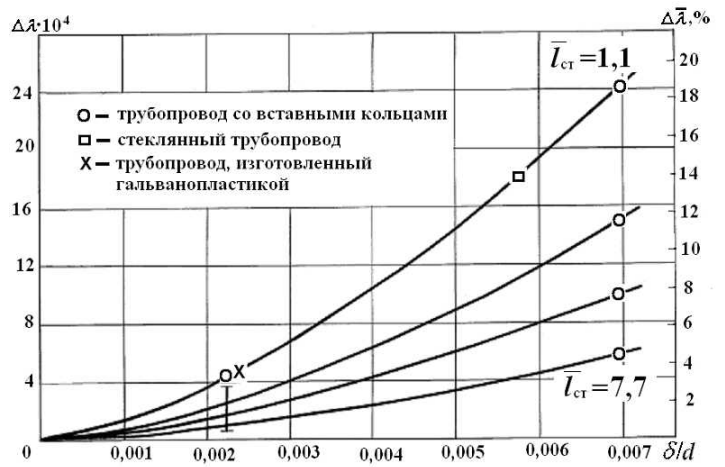
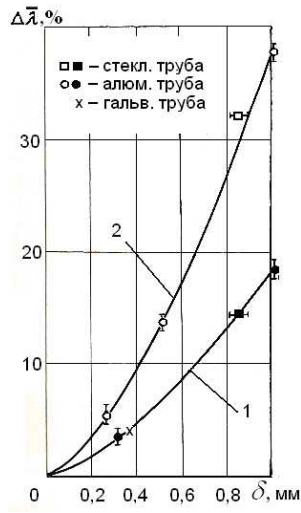
«I» 0,95.

«I»  
 . 3,  
 $\bar{l} = 1,1; 3,3; 5,5; 7,7$

$\bar{\delta} = 0,0022; 0,00235; 0,0057; 0,0069$ .

$$\bar{\delta} = 0,0022 \quad \bar{l} > 1,1$$

$$\Delta\lambda \quad \Delta\bar{\lambda} \\ \langle I \rangle$$



$\Delta\lambda$   $\bar{l}$   $\bar{\delta} = 0,0069$ .  
 $\bar{\delta} \approx 0,0022$ ,  $1,1 - 7,7$   
 $3,8 \quad 0,5 \%$ .

$\rho_0 = 0,2$  ,  $\rho_L = 0,1$  ;  
 $\rho_0 = 1,0$  ,  $\rho_L = 0,9$  (  $\rho_0 - \rho_L = 0,1$  ) ,  
 11 %

$\mu$

( 3,3 )

.4.

5,1

30 50

70  
( ) ,

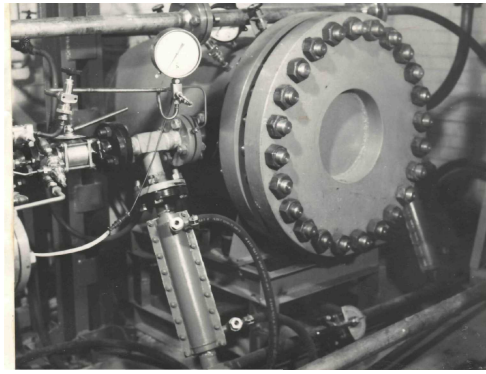


.5.

.4

( )

.6.



.5



.6

( , ) ,

[7, 8].

.7. 50

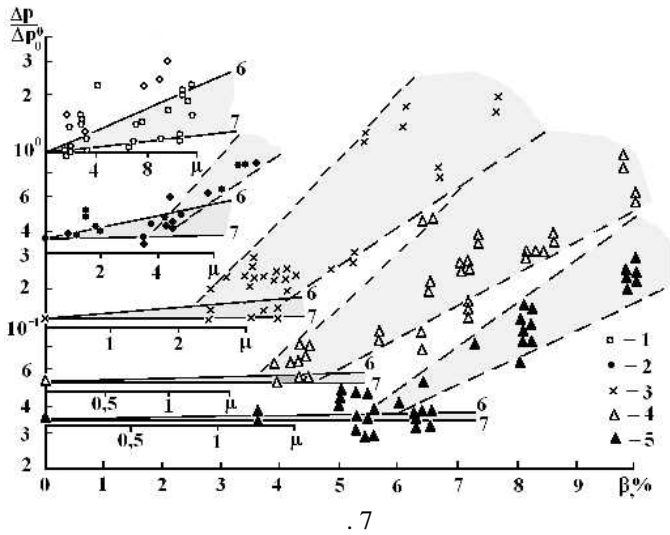
3 .

(β)

$\Delta p$

(μ)

$\Delta p_0^0$



$U = U_{max}$ ).

1, 2, 3, 4, 5 -  
 0; 0,129;  
 0,462; 0,919  
 1,315 .  
 6 7  
 c  
 [9]  
 , -  
 -  
 -  
 (6 -  $U = U_{min}$ , 7 -

3 - 4 %,

[9],

3 - 4 %, -  
 , -  
 -  
 -  
 [10].

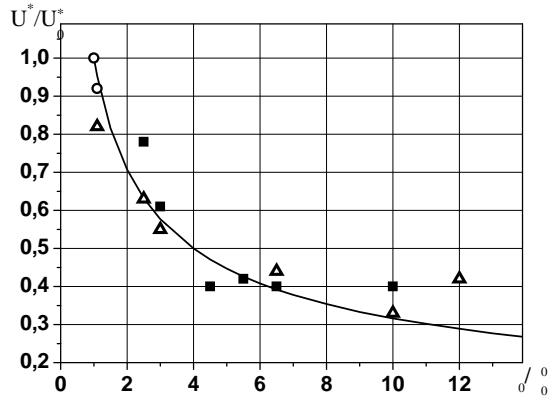
$$u^*/u_0^* = \sqrt{\rho_0/\rho_0^0}$$

[11] ( $u_0^*, \rho_0^0$  -

$\mu$ : -  $\mu = 1,5 - 4,0$ ; -  $\mu = 5 - 9$ ; -  $\mu = 11 - 15$ .

[10]





[8]:

$$= \Delta p \ G / G ,$$

$$\Delta p -$$

;  $G -$  ,  $G -$

.9

$\rho = 0,1; 0,3; 0,5 \ 0,9$

$G = 0,16; 0,44; 0,68 \ / .$

$0,04 - 0,4 \ /$

$\Delta p$  ,

1, 2, 3

$G = 0,16 \ /$

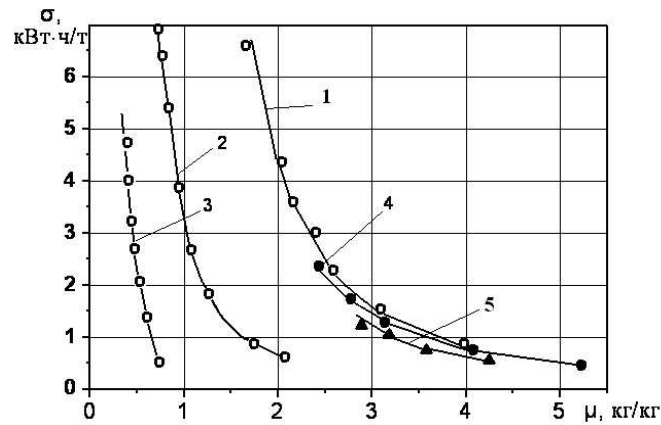
$\rho = 0,1; 0,3 \ 0,5$  ,

4,

5

$\rho = 0,9$

$G = 0,44 \ 0,68 \ / .$



1, 2, 3

$\mu = G_r / G$

$\mu \approx 2 \ /$  ,

.9

6 ,

$\mu \approx 0,8 \ / -$

10

$G = 0,16 \ / .$

1 - 2 2 - 3.

$\mu$

1, 4, 5 ,

0,9

$0,44 - 0,68 \ /$

$0,16 \ /$

0,1 .

42

1. . . . 1160252.  
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3. . . . . ,1989. - . 20-28.  
216 . . . . / . . . . - . : , 1970. -
4. . . . / . . . . - . :  
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20.10.15,  
22.10.15