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$$K = \frac{V}{V}, \quad (1.1)$$

$$\frac{V - V}{V - V}$$

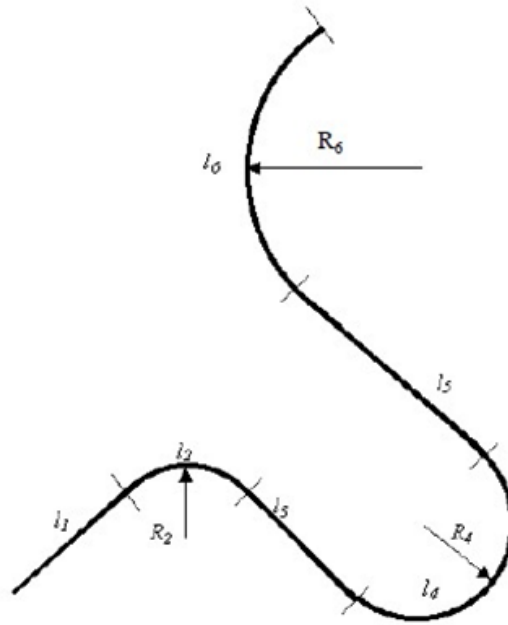
:

$$- K < 0,4 - ;$$

$$- 0,4 < K < 0,6 - ;$$

$$- 0,6 < K < 0,8 - ;$$

$$- 0,8 < K -$$



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:

$$V = \sqrt{V_0^2 + 2 \cdot a' \cdot S \cdot 12960} \tag{1.2},$$

V_0 — ,
 ,
 a' — ,
 , , , / ².
 S — , .
 12960 — ,
 / ² / ².

:

$$V = \sqrt{24^2 + 2 \cdot 0,6 \cdot 0,13 \cdot 12960} = 50,96 \quad / \quad .$$

:

— ,

$$a' = 0,8 + \left(4,3 \cdot \frac{9,8}{100}\right) = 1,2 \quad / \quad ^2$$

—

$$V = \sqrt{24^2 + 2 \cdot 1,2 \cdot 2,92 \cdot 12960} = 302,3 = 120 \quad / \quad .$$

:

—

$$a' = 0,8 + \left(0 \cdot \frac{9,8}{100}\right) = 0,8 \quad / \quad ^2$$

—

$$V = \sqrt{24^2 + 2 \cdot 0,8 \cdot 0,32 \cdot 12960} = 84,9 \quad / \quad .$$

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—

$$a' = 0,8 + \left(2,3 \cdot \frac{9,8}{100}\right) = 1,0 \quad / \quad ^2 ,$$

—

$$V = \sqrt{24^2 + 2 \cdot 1,0 \cdot 2,45 \cdot 12960} = 253,14 = 120 \quad / \quad .$$

:

—

$$a' = 0,8 - \left(1,3 \cdot \frac{9,8}{100}\right) = 0,7 \quad / \quad ^2,$$

—

$$V = \sqrt{24^2 + 2 \cdot 0,7 \cdot 0,16 \cdot 12960} = 59 \quad / \quad .$$

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1.2

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1.4.

$$V = 3,6 \sqrt{g \cdot R \cdot \left(\varphi + \frac{1}{100}\right)}, \quad (1.4)$$

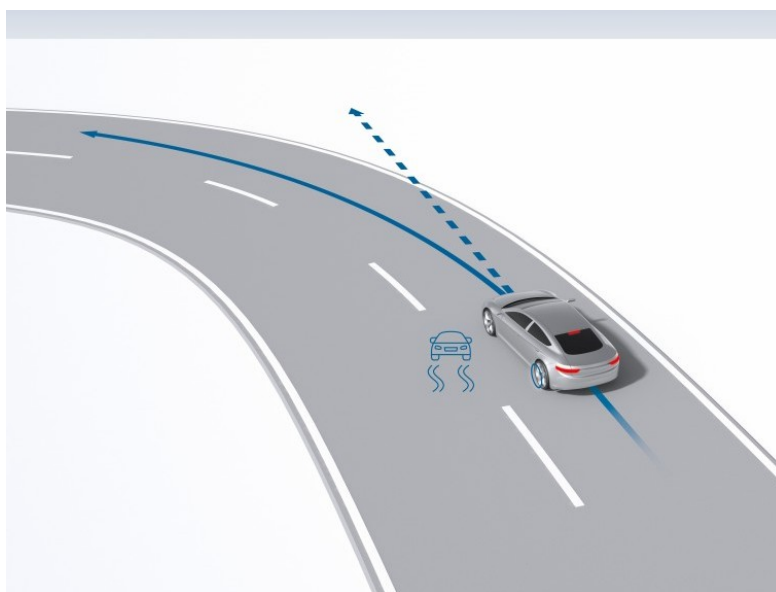
 R —

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φ — ;
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 3,6 — / / .

$\varphi = 0,8$.

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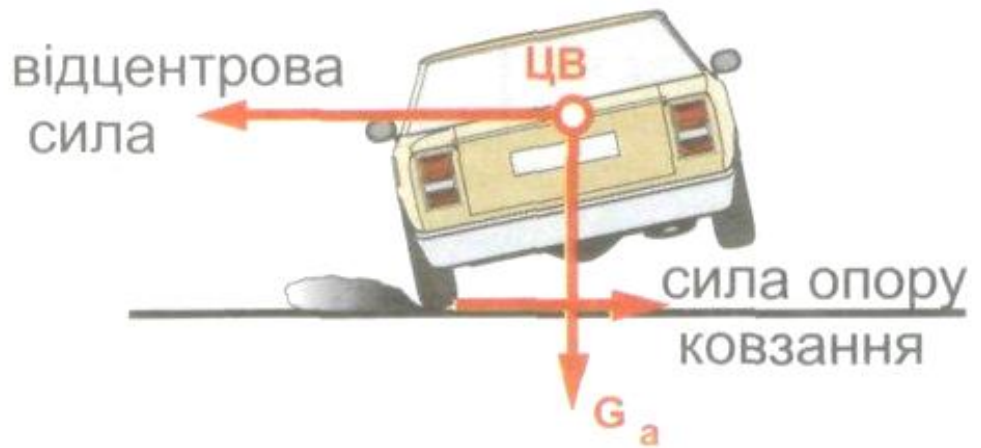
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$$V = 3,6 \sqrt{9,8 \cdot 80 \cdot \left(0,8 + \frac{2,5}{100}\right)} = 91,6 \quad / \quad ;$$

$$V = 3,6 \sqrt{9,8 \cdot 59 \cdot \left(0,8 + \frac{1,5}{100}\right)} = 78,1 \quad / \quad ;$$

$$V = 3,6 \sqrt{9,8 \cdot 130 \cdot \left(0,8 + \frac{0,6}{100}\right)} = 115,4 \quad / \quad ;$$

:

$$V = 3,6 \sqrt{\frac{g \cdot R \cdot B}{2 \cdot h}}, \quad (1.5)$$

B — , $= 2,686$;

h — , $h = 0,573$.

$$V = 3,6 \sqrt{9,8 \cdot 80 \cdot \left(0,8 + \frac{2,5}{100}\right)} = 91,6 \quad / \quad ;$$

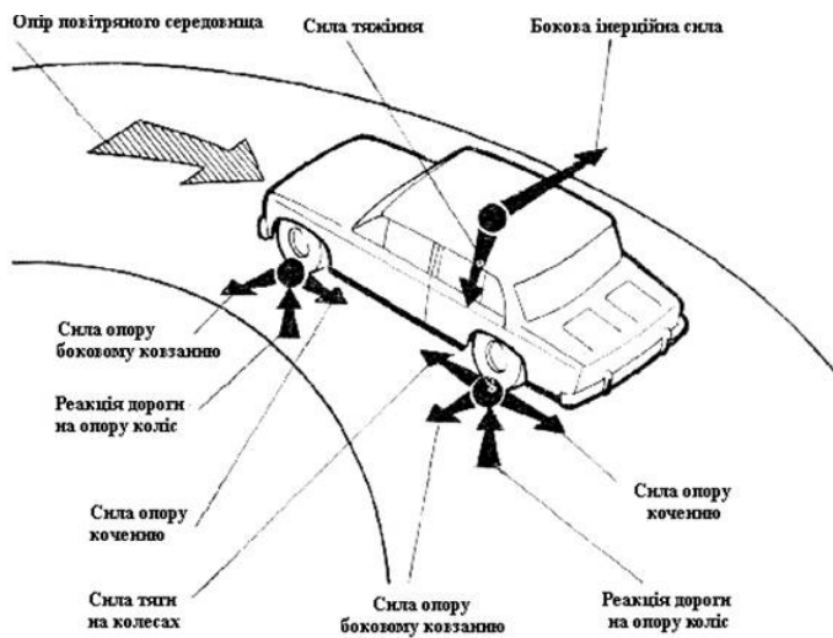
$$V = 3,6 \sqrt{9,8 \cdot 59 \cdot \left(0,8 + \frac{1,5}{100}\right)} = 78,1 \quad / \quad ;$$

$$V = 3,6 \sqrt{9,8 \cdot 130 \cdot \left(0,8 + \frac{0,6}{100}\right)} = 115,4 \quad / \quad ;$$



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7 – ,

$$V = 3.6 \sqrt{\frac{9,8 \cdot 80 \cdot 2,686}{2 \cdot 0,573}} = 154,3 \quad / \quad ;$$

$$V = 3.6 \sqrt{\frac{9,8 \cdot 59 \cdot 2,686}{2 \cdot 0,573}} = 132,5 \quad / \quad ;$$

—

$$V = 3.6 \sqrt{\frac{9,8 \cdot 130 \cdot 2,686}{2 \cdot 0,573}} = 196,7 \quad / \quad ;$$

1.3

$$K = \frac{\min\{V, V\}}{V}, \quad (1.6)$$

:

—

$$K = \frac{91,6}{120} = 0,763;$$

$$K = \frac{91,6}{50,96} = 1,8;$$

—

$$K = \frac{78,1}{120} = 0,65;$$

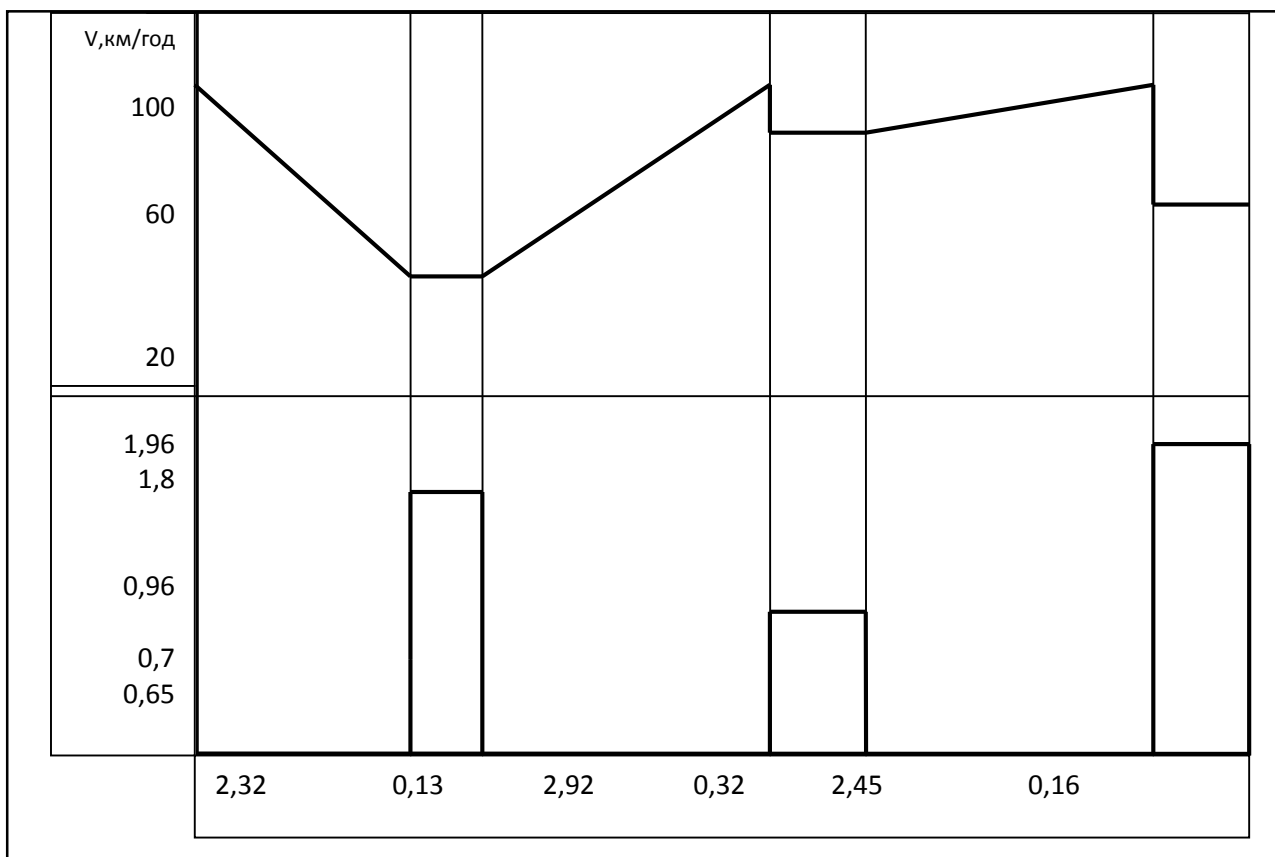
$$K = \frac{78,1}{84,9} = 0,9;$$

—

$$K = \frac{115,4}{120} = 0,96;$$

$$K = \frac{115,4}{59} = 1,96;$$

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$$K = \frac{\sum n}{\sum L}, \quad (1.7)$$

$$K = \frac{10^6 \cdot \sum n}{365 \cdot N \cdot l}, \quad (1.8)$$

N , / ;

l

$$K_T = \frac{\sum n}{\sum n_p}. \quad (1.9)$$

$$K_T' = \frac{\sum n}{\sum n}, \quad (1.10)$$

$$K_T'' = \frac{\sum n_p}{\sum n}, \quad (1.11)$$

$$K_T''' = \frac{(\sum n + \sum n_p)}{\sum n}, \quad (1.12)$$

$P_1 = 1 - \dots ;$
 $P_2 = 1,2 - \dots ;$
 $P_3 = 28 - \dots ;$
 $P_4 = 81 - \dots ;$
 $P_5 = 106 - \dots ;$
 $n \dots n_5 - \dots ;$
 $N - \dots , \dots / \dots .$

.9-11.



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2

$$N_2 = N_{1-2} + N_{3-2} + N_{4-2}, \quad (1.15)$$

$$\begin{aligned} N_{1-2} &= 1-2; \\ N_{3-2} &= 3-2; \\ N_{4-2} &= 4-2. \end{aligned}$$

$$N_2$$

$$N_2 = 500 + 600 + 800 = 1900 \quad ./ \quad .;$$

3

$$N_3 = N_{2-3} + N_{4-3} + N_{5-3} + N_{8-3}, \quad (1.16)$$

$$\begin{aligned} N_{2-3} &= 800 \quad ./ \quad .; \\ N_{4-3} &= 250 \quad ./ \quad .; \\ N_{5-3} &= 150 \quad ./ \quad .; \\ N_{8-3} &= 400 \quad ./ \quad . \end{aligned}$$

$$N_3.$$

$$N_3 = 800 + 250 + 150 + 400 = 1600 \quad ./ \quad .$$

4

$$N_4 = N_{2-4} + N_{3-4} + N_{5-4} + N_{6-4}, \quad (1.17)$$

$$N_{2-4} = 500 \quad ./ \quad .;$$

$$N_{3-4} = 450 \quad ./ \quad .;$$

$$N_{5-4} = 600 \quad ./ \quad .;$$

$$N_{6-4} = 550 \quad ./ \quad .$$

$$N_4 = 500 + 450 + 600 + 550 = 2100 \quad ./ \quad .$$

5

$$N_5 = N_{3-5} + N_{4-5} + N_{6-5} + N_{7-5}, \quad (1.18)$$

$$N_{3-5} = 250 \quad ./ \quad .;$$

$$N_{4-5} = 550 \quad ./ \quad .;$$

$$N_{6-5} = 500 \quad ./ \quad .;$$

$$N_{7-5} = 600 \quad ./ \quad .$$

$$N_5 = 250 + 550 + 500 + 600 = 1900 \quad ./ \quad .$$

6

$$N_6 = N_{4-6} + N_{5-6} + N_{7-6}, \quad (1.19)$$

$$N_{4-6} = 500 \quad ./ \quad .;$$

$$N_{5-6} = 600 \quad ./ \quad .;$$

$$N_{7-6} = 350 \quad ./ \quad .$$

$$N_6 = 500 + 600 + 350 = 1450 \quad ./ \quad .$$

7

$$N_7 = N_{5-7} + N_{6-7} + N_{8-7} + N_{9-7}, \quad (1.20)$$

$$N_{5-7} = 550 \quad ./ \quad .;$$

$$N_{6-7} = 400 \quad ./ \quad .;$$

$$N_{8-7} = 350 \quad ./ \quad .;$$

$$N_{9-7} = 500 \quad ./ \quad .$$

$$N_7 = 550 + 400 + 350 + 500 = 1800 \quad ./ \quad .$$

$$N_8 = N_{3-8} + N_{7-8} + N_{9-8}, \quad (1.21)$$

$$N_{3-8} = 300 \quad ./ \quad .;$$

$$N_{7-8} = 450 \quad ./ \quad .;$$

$$N_{9-8} = 50 \quad ./ \quad .$$

$$N_8 = 300 + 450 + 250 = 1000 \quad ./ \quad .$$

,

$$N_9 = N_{7-9} + N_{8-9}, \quad (1.22)$$

$$N_{7-9} = 400 \quad ./ \quad .;$$

$$N_{8-9} = 250 \quad ./ \quad .$$

$$N_9 = 400 + 250 = 650 \quad ./ \quad .$$

:

$$K_{ai} = \frac{n \cdot 10^6}{365 \cdot N_i}, \quad (1.23)$$

$$n \quad - \quad , \quad ;$$

$$- \quad = 0,1;$$

$$N \quad - \quad , \quad ./ \quad .$$

$$- \quad 2$$

$$K_{a2} = \frac{2 \cdot 0,1 \cdot 10^6}{365 \cdot 1900} = 0,29;$$

$$- \quad 3$$

$$K_{a3} = \frac{8 \cdot 0,1 \cdot 10^6}{365 \cdot 1600} = 1,37;$$

$$- \quad 4$$

$$K_{a4} = \frac{5 \cdot 0,1 \cdot 10^6}{365 \cdot 2100} = 0,65;$$

$$- \quad 5$$

$$K_{a5} = \frac{2 \cdot 0,1 \cdot 10^6}{365 \cdot 1900} = 0,29;$$

– 6

$$K_{a6} = \frac{15 \cdot 0,1 \cdot 10^6}{365 \cdot 1450} = 2,83;$$

– 7

$$K_{a7} = \frac{7 \cdot 0,1 \cdot 10^6}{365 \cdot 1800} = 1,06;$$

– 8

$$K_{a8} = \frac{11 \cdot 0,1 \cdot 10^6}{365 \cdot 1000} = 3,01;$$

– 9

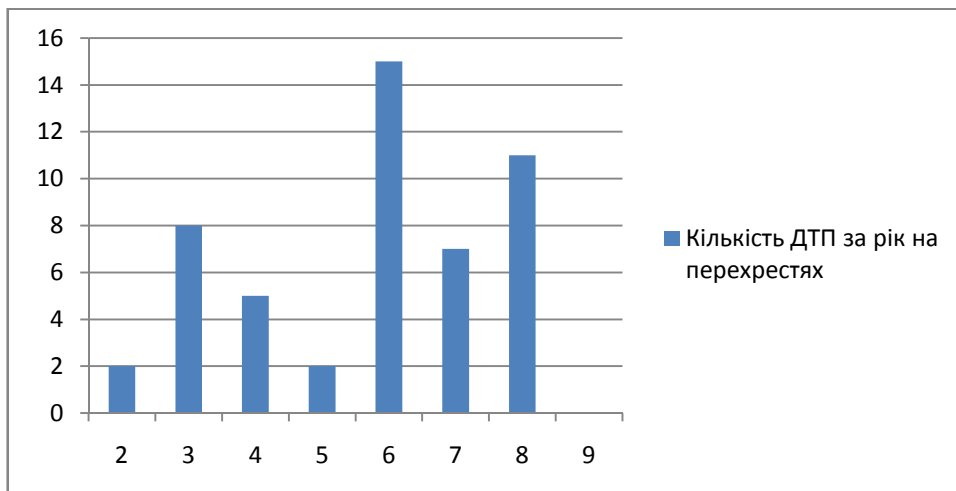
$$K_{a9} = \frac{0 \cdot 0,1 \cdot 10^6}{365 \cdot 650} = 0.$$

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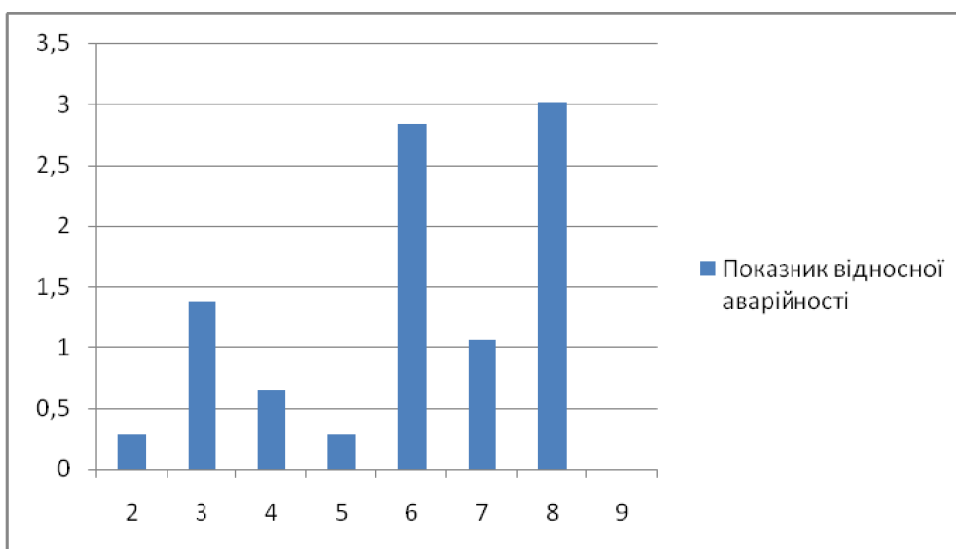
	, /		
2	1900	2	0,29
3	1600	8	1,37
4	2100	5	0,65
5	1900	2	0,29
6	1450	15	2,83
7	1800	7	1,06
8	1000	11	3,01
9	650	0	0



12 –



13 –



14 –

2.2

$$N_{ai} = N_{i-j} + N_{j-i}, \quad (1.24)$$

$$N_{1-2} = 500 + 600 = 1100 \quad ./ \quad .;$$

$$N_{2-3} = 800 + 600 = 1400 \quad ./ \quad .;$$

$$N_{2-4} = 500 + 800 = 1300 \quad ./ \quad .;$$

$$N_{3-4} = 450 + 250 = 700 \quad ./ \quad .;$$

$$N_{3-5} = 250 + 150 = 400 \quad ./ \quad .;$$

$$N_{3-8} = 300 + 400 = 700 \quad ./ \quad .;$$

$$N_{4-5} = 550 + 600 = 1150 \quad ./ \quad .;$$

$$N_{4-6} = 500 + 550 = 1050 \quad ./ \quad .;$$

$$N_{5-6} = 600 + 500 = 1100 \quad ./ \quad .;$$

$$N_{5-7} = 550 + 600 = 1150 \quad ./ \quad .;$$

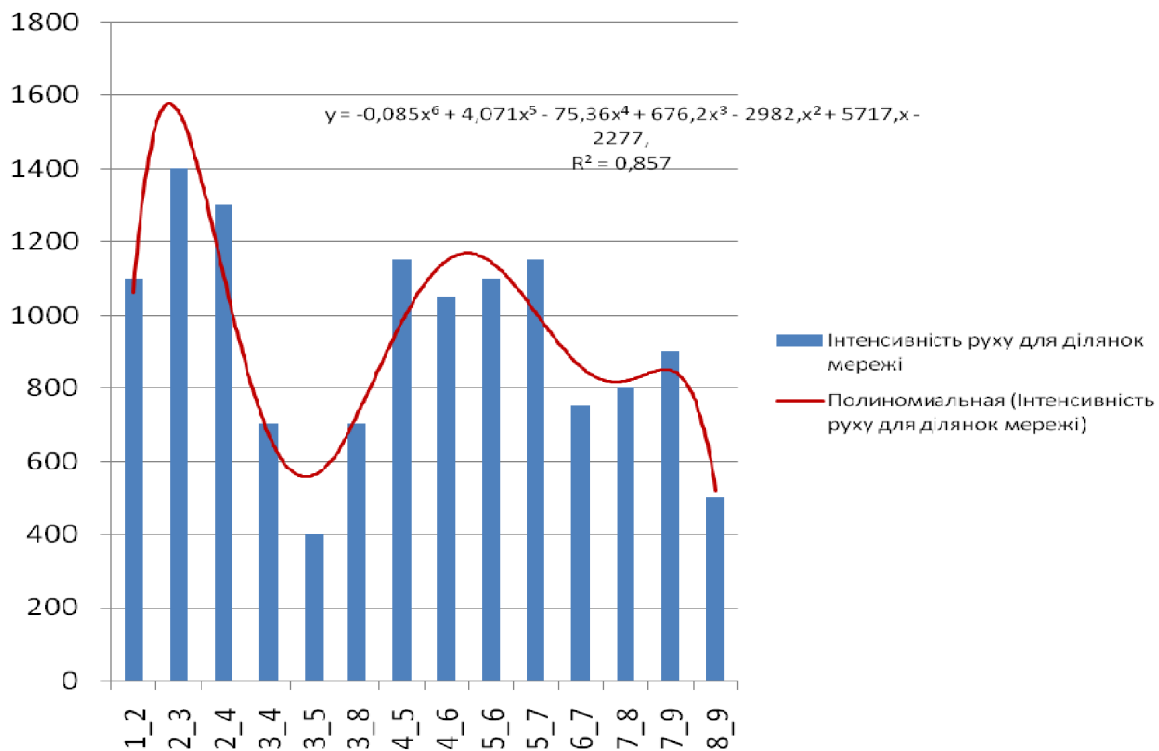
$$N_{6-7} = 400 + 350 = 750 \quad ./ \quad .;$$

$$N_{7-8} = 450 + 350 = 800 \quad ./ \quad .;$$

$$N_{7-9} = 400 + 500 = 900 \quad ./ \quad .;$$

$$N_{8-9} = 250 + 250 = 500 \quad ./ \quad .$$

Інтенсивність руху для ділянок мережі



15 –

2.3

:

$$K_{ai-j} = \frac{n_{i-j} \cdot 10^6}{365 \cdot N_{ai-j}}; \quad (1.25)$$

$$K'_{ai-j} = \frac{n_{i-j} \cdot 10^6}{365 \cdot N_{ai-j} \cdot l_{i-j}}; \quad (1.26)$$

l_{i-j} - , .

$$K_{ai-j}^n = \frac{n^{i-j}}{l_{i-j}}. \quad (1.27)$$

$$K_{a1-2} = \frac{2 \cdot 0,1 \cdot 10^6}{365 \cdot 1100} = 0,5;$$

$$K_{a2-3} = \frac{4 \cdot 0,1 \cdot 10^6}{365 \cdot 1400} = 0,8;$$

$$K_{a2-4} = \frac{2 \cdot 0,1 \cdot 10^6}{365 \cdot 1300} = 0,4;$$

$$K_{a3-4} = \frac{1 \cdot 0,1 \cdot 10^6}{365 \cdot 700} = 0,4;$$

$$K_{a3-5} = \frac{4 \cdot 0,1 \cdot 10^6}{365 \cdot 400} = 2,7;$$

$$K_{a3-8} = \frac{7 \cdot 0,1 \cdot 10^6}{365 \cdot 700} = 2,7;$$

$$K_{a4-5} = \frac{5 \cdot 0,1 \cdot 10^6}{365 \cdot 1150} = 1,19;$$

$$K_{a4-6} = \frac{4 \cdot 0,1 \cdot 10^6}{365 \cdot 1050} = 1,0;$$

$$K_{a5-6} = \frac{0 \cdot 0,1 \cdot 10^6}{365 \cdot 1100} = 0;$$

$$K_{a5-7} = \frac{2 \cdot 0,1 \cdot 10^6}{365 \cdot 1150} = 0,5;$$

$$K_{a6-7} = \frac{10 \cdot 0,1 \cdot 10^6}{365 \cdot 750} = 3,65;$$

$$K_{a7-8} = \frac{9 \cdot 0,1 \cdot 10^6}{365 \cdot 800} = 3,0;$$

$$K_{a7-9} = \frac{4 \cdot 0,1 \cdot 10^6}{365 \cdot 900} = 1,2;$$

$$K_{a8-9} = \frac{3 \cdot 0,1 \cdot 10^6}{365 \cdot 500} = 1,6.$$

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$$K'_{a1-2} = \frac{2 \cdot 0,1 \cdot 10^6}{365 \cdot 1100 \cdot 1,2} = 0,4;$$

$$K'_{a2-3} = \frac{4 \cdot 0,1 \cdot 10^6}{365 \cdot 1400 \cdot 0,8} = 0,98;$$

$$K'_{a2-4} = \frac{2 \cdot 0,1 \cdot 10^6}{365 \cdot 1300 \cdot 2,3} = 0,2;$$

$$K'_{a3-4} = \frac{1 \cdot 0,1 \cdot 10^6}{365 \cdot 700 \cdot 1,6} = 0,2;$$

$$K'_{a3-5} = \frac{4 \cdot 0,1 \cdot 10^6}{365 \cdot 400 \cdot 2,3} = 1,2;$$

$$K'_{a3-8} = \frac{7 \cdot 0,1 \cdot 10^6}{365 \cdot 700 \cdot 1,3} = 2,1;$$

$$K'_{a4-5} = \frac{5 \cdot 0,1 \cdot 10^6}{365 \cdot 1150 \cdot 0,6} = 2,0;$$

$$K'_{a4-6} = \frac{4 \cdot 0,1 \cdot 10^6}{365 \cdot 1050 \cdot 3,4} = 0,3;$$

$$K'_{a5-6} = \frac{0 \cdot 0,1 \cdot 10^6}{365 \cdot 1100 \cdot 1,6} = 0;$$

$$K'_{a5-7} = \frac{2 \cdot 0,1 \cdot 10^6}{365 \cdot 1150 \cdot 0,6} = 0,8;$$

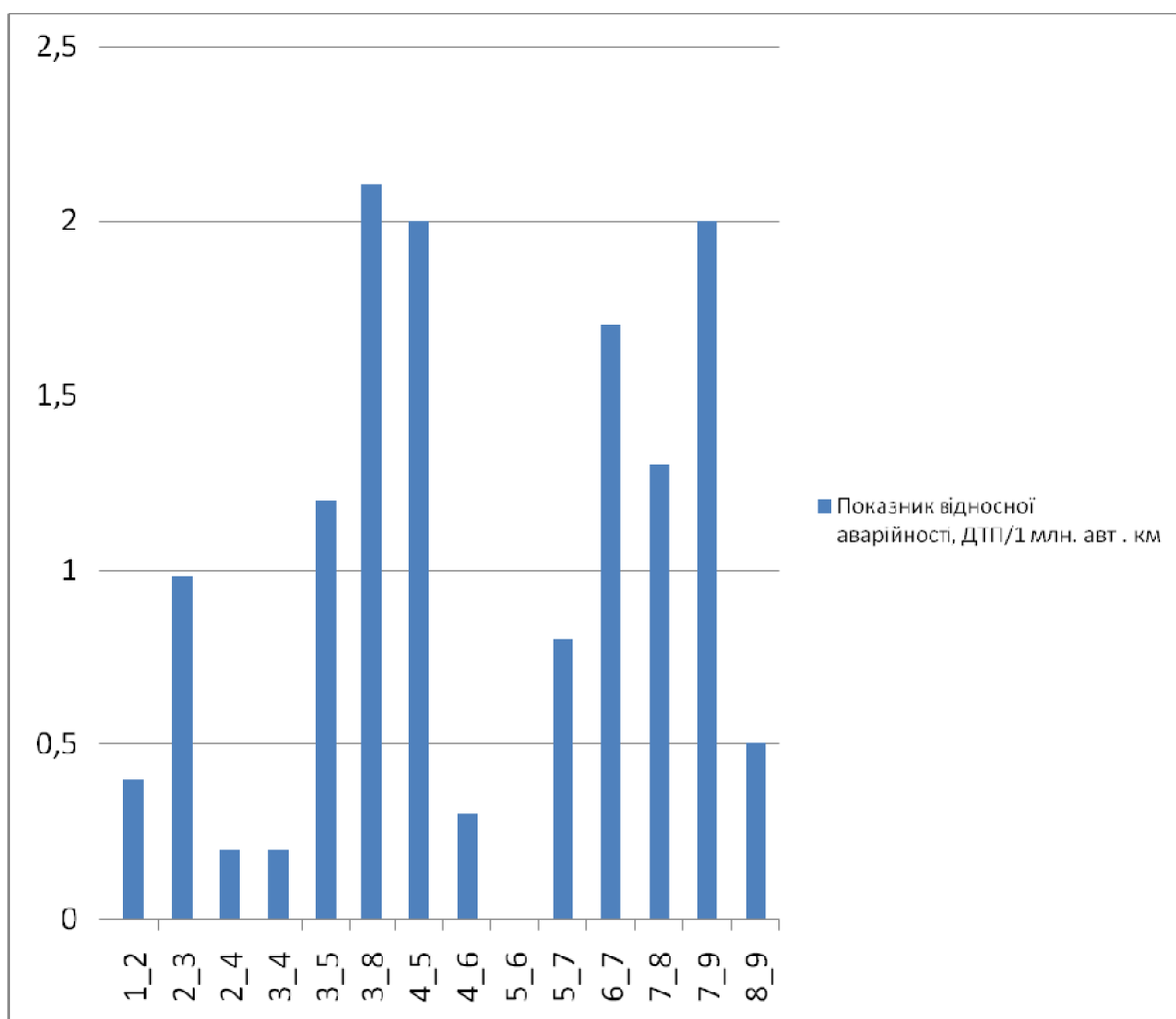
$$K'_{a6-7} = \frac{10 \cdot 0,1 \cdot 10^6}{365 \cdot 750 \cdot 2,1} = 1,7;$$

$$K'_{a7-8} = \frac{9 \cdot 0,1 \cdot 10^6}{365 \cdot 800 \cdot 2,4} = 1,3;$$

$$K'_{a7-9} = \frac{4 \cdot 0,1 \cdot 10^6}{365 \cdot 900 \cdot 0,6} = 2,0;$$

$$K'_{a8-9} = \frac{3 \cdot 0,1 \cdot 10^6}{365 \cdot 500 \cdot 3,6} = 0,5.$$

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$$K''_{a1-2} = \frac{2}{1,2} = 1,7;$$

$$K''_{a2-3} = \frac{4}{0,8} = 5;$$

$$K''_{a2-4} = \frac{2}{2,3} = 0,9;$$

$$K''_{a3-4} = \frac{1}{1,6} = 0,6;$$

$$K''_{a3-5} = \frac{4}{2,3} = 1,7;$$

$$K''_{a3-8} = \frac{7}{1,3} = 5,4;$$

$$K''_{a4-5} = \frac{5}{0,6} = 8,3;$$

$$K''_{a4-6} = \frac{4}{3,4} = 1,18;$$

$$K''_{a5-6} = \frac{0}{1,6} = 0;$$

$$K''_{a5-7} = \frac{2}{0,6} = 3,3;$$

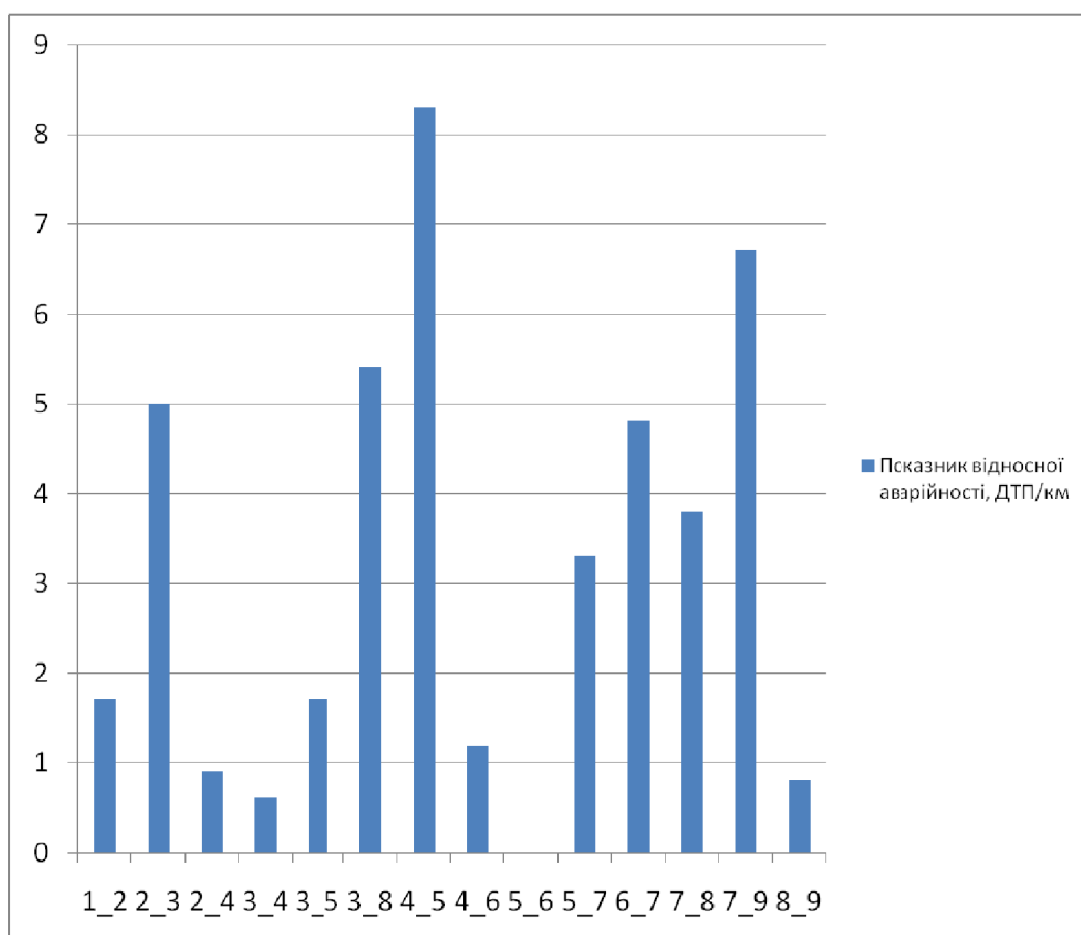
$$K''_{a6-7} = \frac{10}{2,1} = 4,8;$$

$$K''_{a7-8} = \frac{9}{2,4} = 3,8;$$

$$K''_{a7-9} = \frac{4}{0,6} = 6,7;$$

$$K''_{a8-9} = \frac{3}{3,6} = 0,8.$$

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$$V = 91,6 \quad / \quad ;$$

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$$V = 78,1 \quad / \quad ;$$

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$$V = 115,4 \quad / \quad ;$$

$$V = 91,6 \quad / \quad ;$$

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$$V = 78,1 \quad / \quad ;$$

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$$V = 115,4 \quad / \quad ;$$

$$V = 154,3 \quad / \quad ;$$

$$V = 132,5 \quad / \quad ;$$

—

$$V = 196,7 \quad / \quad ;$$

—

$$K = 0,763;$$

$$K = 1,8;$$

–

$$K = 0,65;$$

$$K = 0,9;$$

–

$$K = 0,96;$$

$$K = 1,96;$$

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2	1900	2	0,29
3	1600	8	1,37
4	2100	5	0,65
5	1900	2	0,29
6	1450	15	2,83
7	1800	7	1,06
8	1000	11	3,01
9	650	0	0

:

			K_{ai-j} , / 10^6	K'_{ai-j} , / 10_6	K''_{ai-j} , /
1-2	1100	1,2	0,5	0,4	1,7
2-3	1400	0,8	0,8	0,98	5
2-4	1300	2,3	0,4	0,2	0,9
3-4	700	1,6	0,4	0,2	0,6
3-5	400	2,3	2,7	1,2	1,7
3-8	700	1,3	2,7	2,1	5,4
4-5	1150	0,6	1,19	2,0	8,3
4-6	1050	3,4	1,0	0,3	1,18
5-6	1100	1,6	0	0	0
5-7	1150	0,6	0,5	0,8	3,3
6-7	750	2,1	3,65	1,7	4,8
7-8	800	2,4	3,0	1,3	3,8
7-9	900	0,6	1,2	2,0	6,7
8-9	500	3,6	1,6	0,5	0,8

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