

Рисунок 1 – График ЛКП для  $X_0 = 7, a = 106, c = 1283, m = 6075$

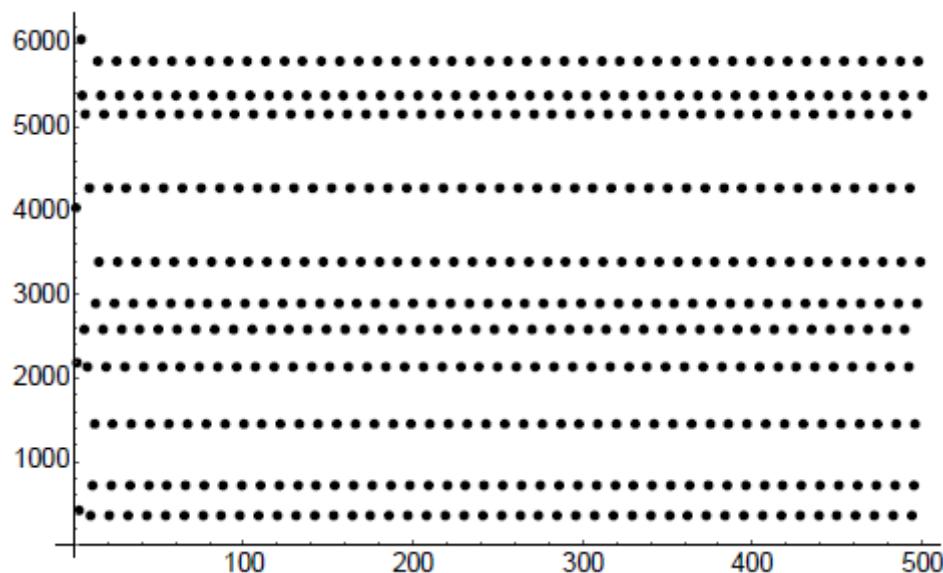


Рисунок 2 - График ЛКП для  $X_0 = 7, a = 105, c = 1283, m = 6075$

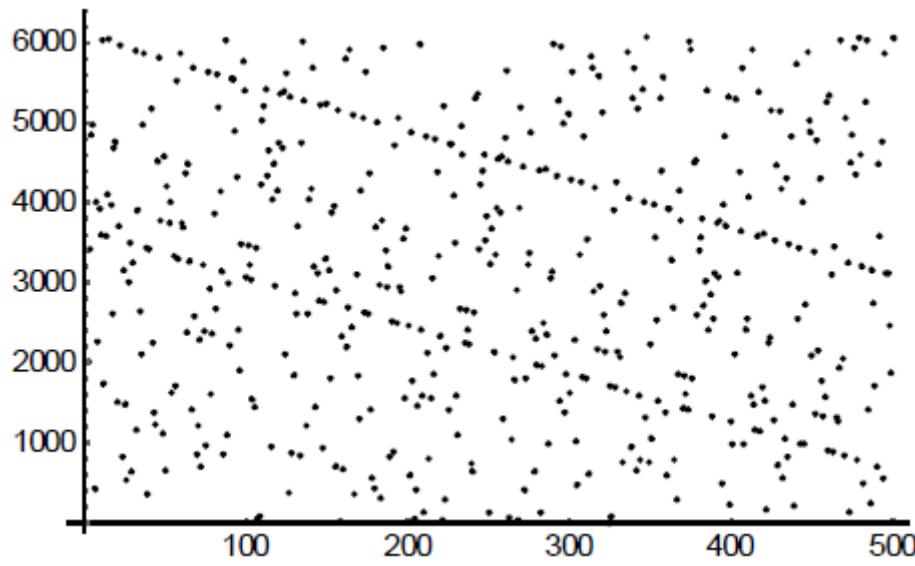


Рисунок 3 - График ЛКП для  $X_0 = 7, a = 105, c = 1284, m = 6075$

Таблица 1 – Константы для линейных конгруэнтных генераторов, приводящие к максимальному периоду формируемой последовательности

| Номер | $a$  | $b$   | $m$    |
|-------|------|-------|--------|
| 1     | 106  | 1283  | 6075   |
| 2     | 1366 | 1283  | 6075   |
| 3     | 936  | 1399  | 6655   |
| 4     | 211  | 1663  | 7875   |
| 5     | 421  | 1663  | 7875   |
| 6     | 430  | 2531  | 11979  |
| 7     | 859  | 2531  | 11979  |
| 8     | 1741 | 2731  | 12960  |
| 9     | 1541 | 2957  | 14000  |
| 10    | 967  | 3041  | 14406  |
| 11    | 1291 | 4621  | 21870  |
| 12    | 419  | 6173  | 29282  |
| 13    | 1255 | 6173  | 29282  |
| 14    | 625  | 6571  | 31104  |
| 15    | 171  | 11213 | 53125  |
| 16    | 421  | 17117 | 81000  |
| 17    | 1093 | 18257 | 86436  |
| 18    | 1021 | 24631 | 116640 |
| 19    | 1277 | 24749 | 117128 |
| 20    | 2311 | 25367 | 120050 |

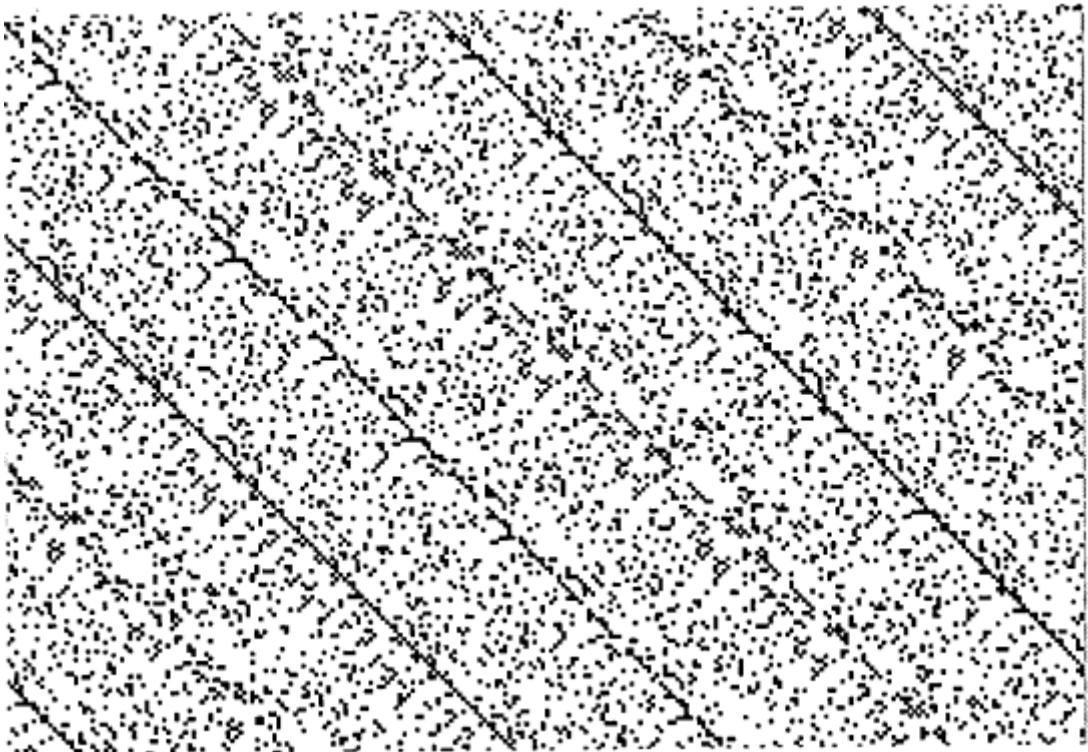


Рисунок 4 – Распределение на плоскости для генератора  
 $x_{n+1} = (99x_n^2 + 430x_n + 2531)(mod\ 11979)$

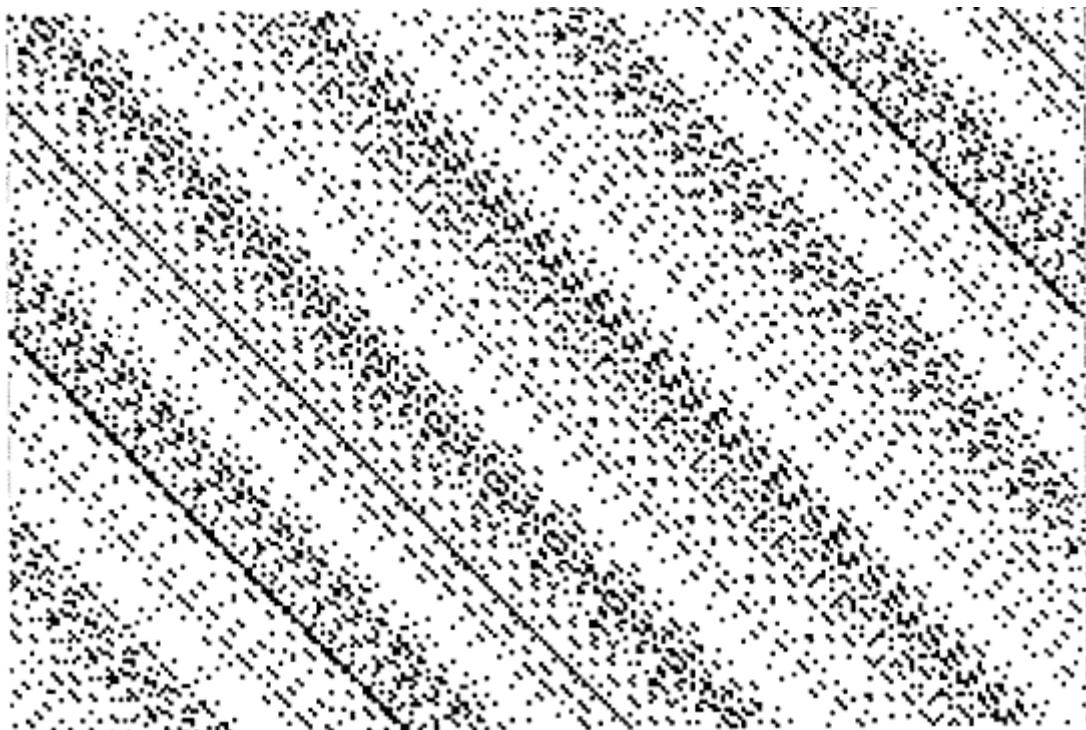


Рисунок 5 - Распределение на плоскости для генератора  
 $x_{n+1} = (363x_n^3 + 99x_n^2 + 430x_n + 2531)(mod\ 11979)$

Таблица 2 – неприводимые многочлены над полем  $GF(2)$

| №   | Степень $m$ | Аналитическое представление многочлена  | Примитивный многочлен | Порядок $c$ |
|-----|-------------|---|-----------------------|-------------|
| 1.  | 1           | $x + 1$                                 | да                    | 1           |
| 2.  | 2           | $x^2 + x + 1$                           | да                    | 3           |
| 3.  | 3           | $x^3 + x + 1$                           | да                    | 7           |
| 4.  | 3           | $x^3 + x^2 + 1$                         | да                    | 7           |
| 5.  | 4           | $x^4 + x + 1$                           | да                    | 15          |
| 6.  | 4           | $x^4 + x^3 + 1$                         | да                    | 15          |
| 7.  | 4           | $x^4 + x^3 + x^2 + x + 1$               | нет                   | 5           |
| 8.  | 5           | $x^5 + x^2 + 1$                         | да                    | 31          |
| 9.  | 5           | $x^5 + x^3 + 1$                         | да                    | 31          |
| 10. | 5           | $x^5 + x^3 + x^2 + x + 1$               | да                    | 31          |
| 11. | 5           | $x^5 + x^4 + x^2 + x + 1$               | да                    | 31          |
| 12. | 5           | $x^5 + x^4 + x^3 + x + 1$               | да                    | 31          |
| 13. | 5           | $x^5 + x^4 + x^3 + x^2 + 1$             | да                    | 31          |
| 14. | 6           | $x^6 + x + 1$                           | да                    | 63          |
| 15. | 6           | $x^6 + x^3 + 1$                         | нет                   | 9           |
| 16. | 6           | $x^6 + x^4 + x^2 + x + 1$               | нет                   | 21          |
| 17. | 6           | $x^6 + x^4 + x^3 + x + 1$               | да                    | 63          |
| 18. | 6           | $x^6 + x^5 + 1$                         | да                    | 63          |
| 19. | 6           | $x^6 + x^5 + x^2 + x + 1$               | да                    | 63          |
| 20. | 6           | $x^6 + x^5 + x^3 + x^2 + 1$             | да                    | 63          |
| 21. | 6           | $x^6 + x^5 + x^4 + x + 1$               | да                    | 63          |
| 22. | 6           | $x^6 + x^5 + x^4 + x^2 + 1$             | нет                   | 21          |
| 23. | 7           | $x^7 + x + 1$                           | да                    | 127         |
| 24. | 7           | $x^7 + x^3 + 1$                         | да                    | 127         |
| 25. | 7           | $x^7 + x^3 + x^2 + x + 1$               | да                    | 127         |
| 26. | 7           | $x^7 + x^4 + 1$                         | да                    | 127         |
| 27. | 7           | $x^7 + x^4 + x^3 + x^2 + 1$             | да                    | 127         |
| 28. | 7           | $x^7 + x^5 + x^2 + x + 1$               | да                    | 127         |
| 29. | 7           | $x^7 + x^5 + x^3 + x + 1$               | да                    | 127         |
| 30. | 7           | $x^7 + x^5 + x^4 + x^3 + 1$             | да                    | 127         |
| 31. | 7           | $x^7 + x^5 + x^4 + x^3 + x^2 + x + 1$   | да                    | 127         |
| 32. | 7           | $x^7 + x^6 + 1$                         | да                    | 127         |
| 33. | 7           | $x^7 + x^6 + x^3 + x + 1$               | да                    | 127         |
| 34. | 7           | $x^7 + x^6 + x^4 + x + 1$               | да                    | 127         |
| 35. | 7           | $x^7 + x^6 + x^4 + x^2 + 1$             | да                    | 127         |
| 36. | 7           | $x^7 + x^6 + x^5 + x^2 + 1$             | да                    | 127         |
| 37. | 7           | $x^7 + x^6 + x^5 + x^3 + x^2 + x + 1$   | да                    | 127         |
| 38. | 7           | $x^7 + x^6 + x^5 + x^4 + 1$             | да                    | 127         |
| 39. | 7           | $x^7 + x^6 + x^5 + x^4 + x^2 + x + 1$   | да                    | 127         |
| 40. | 7           | $x^7 + x^6 + x^5 + x^4 + x^3 + x^2 + 1$ | да                    | 127         |
| 41. | 8           | $x^8 + x^4 + x^3 + x + 1$               | нет                   | 51          |
| 42. | 8           | $x^8 + x^4 + x^3 + x^2 + 1$             | да                    | 255         |
| 43. | 8           | $x^8 + x^5 + x^3 + x + 1$               | да                    | 255         |
| 44. | 8           | $x^8 + x^5 + x^3 + x^2 + 1$             | да                    | 255         |
| 45. | 8           | $x^8 + x^5 + x^4 + x^3 + 1$             | нет                   | 17          |
| 46. | 8           | $x^8 + x^5 + x^4 + x^3 + x^2 + x + 1$   | нет                   | 85          |
| 47. | 8           | $x^8 + x^6 + x^3 + x^2 + 1$             | да                    | 255         |
| 48. | 8           | $x^8 + x^6 + x^4 + x^3 + x^2 + x + 1$   | да                    | 255         |
| 49. | 8           | $x^8 + x^6 + x^5 + x + 1$               | да                    | 255         |
| 50. | 8           | $x^8 + x^6 + x^5 + x^2 + 1$             | да                    | 255         |

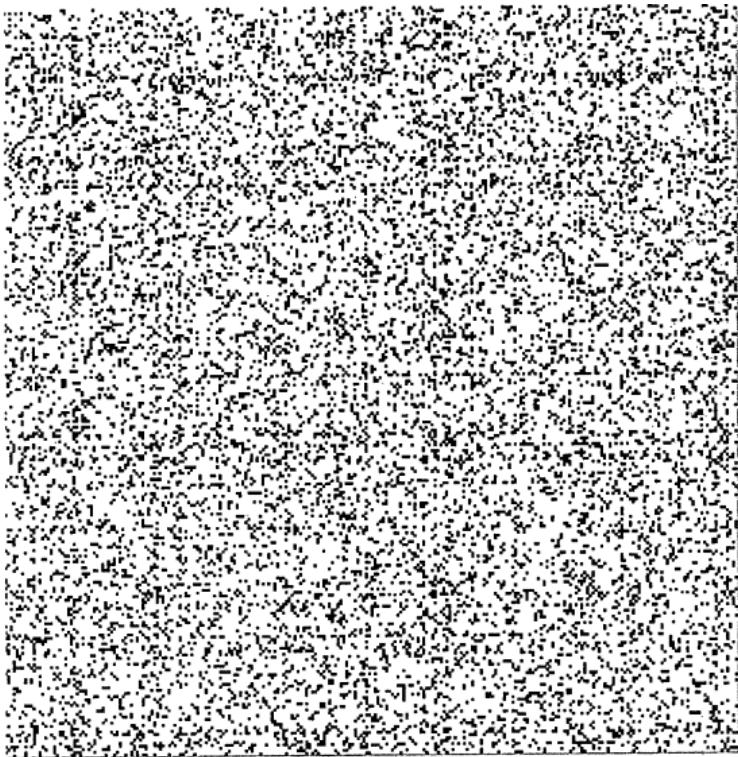


Рисунок 6 - Распределение на плоскости для генератора  
 $x_{n+1} = (x_n + x_{n-1}) (\text{mod } 11979)$

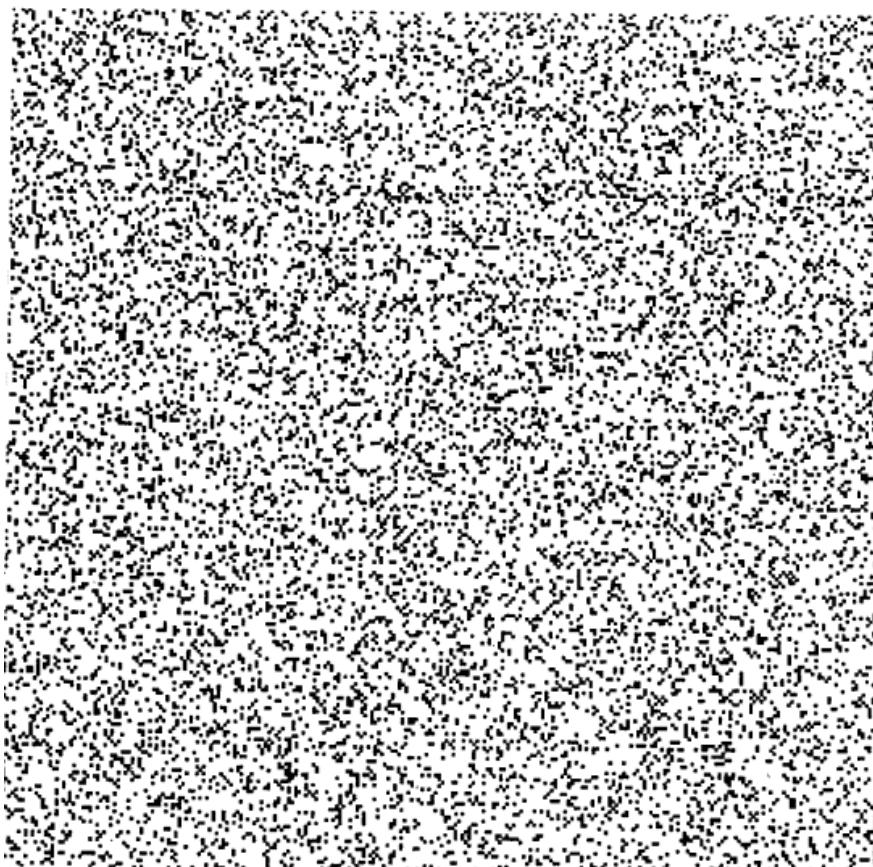


Рисунок 7 - Распределение на плоскости для генератора  
 $x_n = (x_{n-3} + x_{n-7}) (\text{mod } 256)$

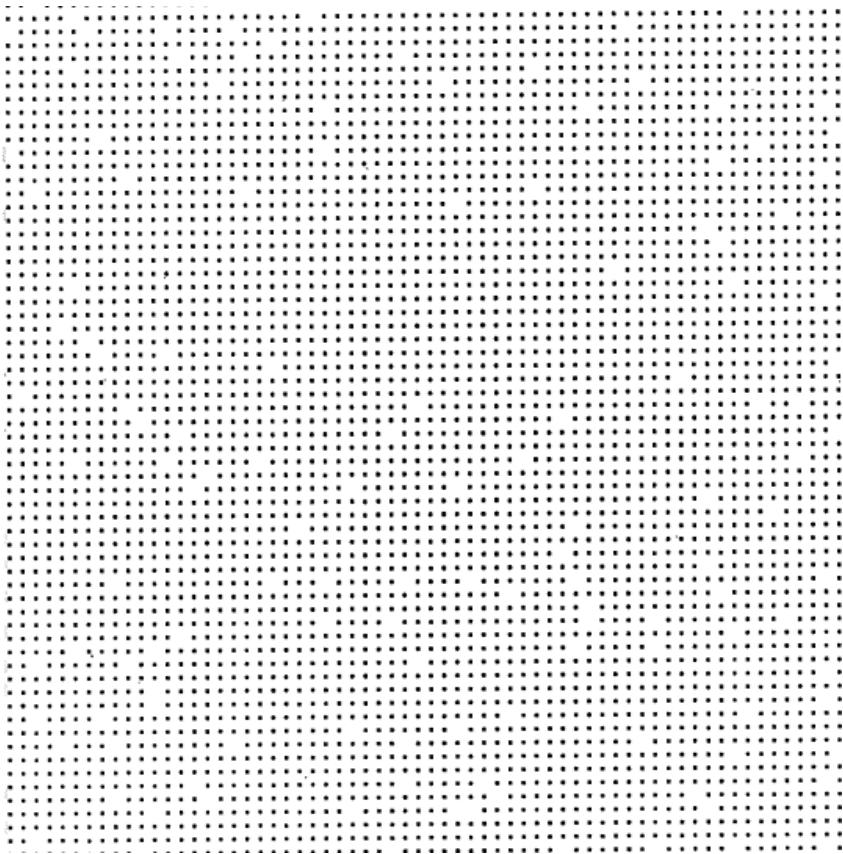


Рисунок 8 - Распределение на плоскости для генератора  
 $x_n = (x_{n-4} + x_{n-11}) \pmod{256}$



Рисунок 9 - Распределение на плоскости для генератора  
 $x_n = (4x_{n-1} + 9x_{n-2}) \pmod{11}$

Таблица 3 – Стандартная часть таблицы символов ascii

| символ | 10-й<br>код | 2-й код |
|--------|-------------|---------|--------|-------------|---------|--------|-------------|---------|--------|-------------|---------|
| 32     | 00100000    | 8       | 56     | 00111000    | P       | 80     | 01010000    | h       | 104    | 01101000    |         |
| !      | 00100001    | 9       | 57     | 00111001    | Q       | 81     | 01010001    | i       | 105    | 01101001    |         |
| "      | 00100010    | :       | 58     | 00111010    | R       | 82     | 01010010    | j       | 106    | 01101010    |         |
| #      | 00100011    | ;       | 59     | 00111011    | S       | 83     | 01010011    | k       | 107    | 01101011    |         |
| \$     | 00100100    | <       | 60     | 00111100    | T       | 84     | 01010100    | l       | 108    | 01101100    |         |
| %      | 00100101    | =       | 61     | 00111101    | U       | 85     | 01010101    | m       | 109    | 01101101    |         |
| &      | 00100110    | >       | 62     | 00111110    | V       | 86     | 01010110    | n       | 110    | 01101110    |         |
| '      | 00100111    | ?       | 63     | 00111111    | W       | 87     | 01010111    | o       | 111    | 01101111    |         |
| (      | 00101000    | @       | 64     | 01000000    | X       | 88     | 01011000    | p       | 112    | 01110000    |         |
| )      | 00101001    | A       | 65     | 01000001    | Y       | 89     | 01011001    | q       | 113    | 01110001    |         |
| *      | 00101010    | B       | 66     | 01000010    | Z       | 90     | 01011010    | r       | 114    | 01110010    |         |
| +      | 00101011    | C       | 67     | 01000011    | \       | 91     | 01011011    | s       | 115    | 01110011    |         |
| ,      | 00101100    | D       | 68     | 01000100    | \       | 92     | 01011100    | t       | 116    | 01110100    |         |
| -      | 00101101    | E       | 69     | 01000101    | \       | 93     | 01011101    | u       | 117    | 01110101    |         |
| .      | 00101110    | F       | 70     | 01000110    | ^       | 94     | 01011110    | v       | 118    | 01110110    |         |
| /      | 00101111    | G       | 71     | 01000111    | -       | 95     | 01011111    | w       | 119    | 01110111    |         |
| 0      | 00110000    | H       | 72     | 01001000    | -`      | 96     | 01100000    | x       | 120    | 01111000    |         |
| 1      | 00110001    | I       | 73     | 01001001    | a       | 97     | 01100001    | y       | 121    | 01111001    |         |
| 2      | 00110010    | J       | 74     | 01001010    | b       | 98     | 01100010    | z       | 122    | 01111010    |         |
| 3      | 00110011    | K       | 75     | 01001011    | c       | 99     | 01100011    | {       | 123    | 01111011    |         |
| 4      | 00110100    | L       | 76     | 01001100    | d       | 100    | 01100100    |         | 124    | 01111100    |         |
| 5      | 00110101    | M       | 77     | 01001101    | e       | 101    | 01100101    | }       | 125    | 01111101    |         |
| 6      | 00110110    | N       | 78     | 01001110    | f       | 102    | 01100110    | ~       | 126    | 01111110    |         |
| 7      | 00110111    | O       | 79     | 01001111    | g       | 103    | 01100111    | □       | 127    | 01111111    |         |

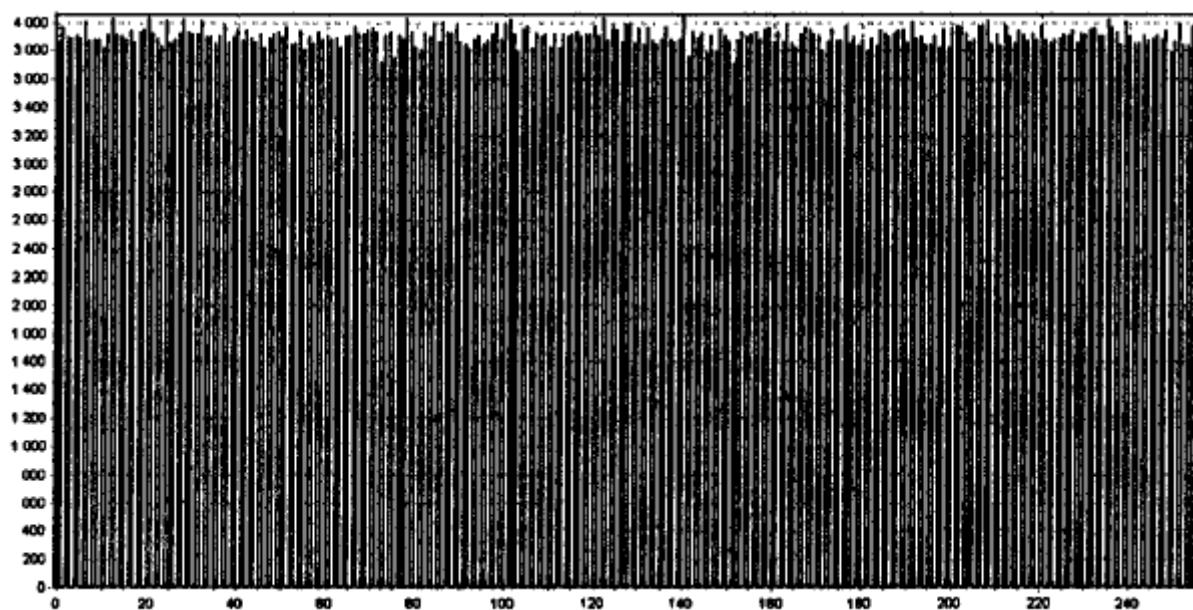


Рисунок 10 – Пример гистограммы: результат положительный

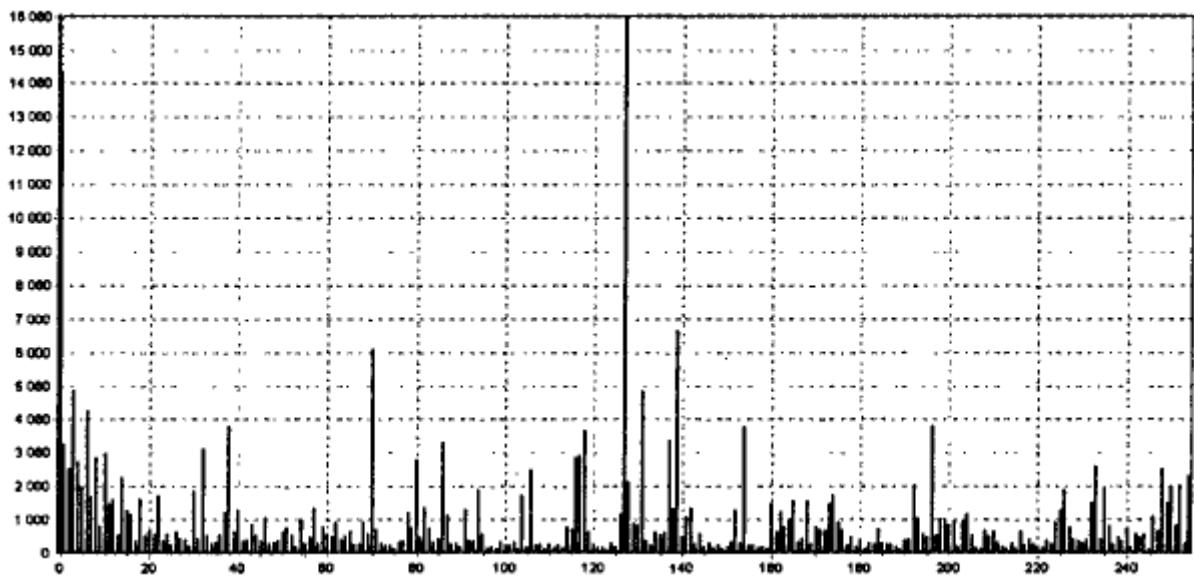


Рисунок 11 -- Пример гистограммы: результат отрицательный

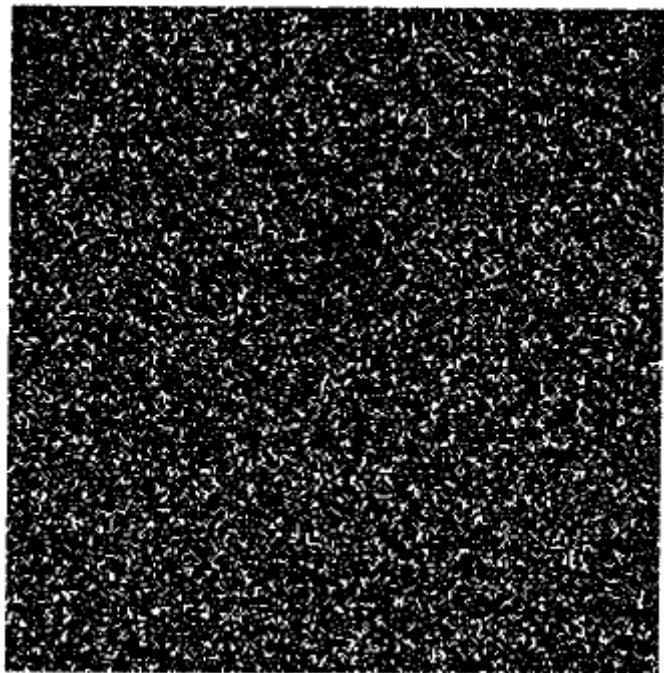


Рисунок 12 – Пример распределения на плоскости: результат положительный

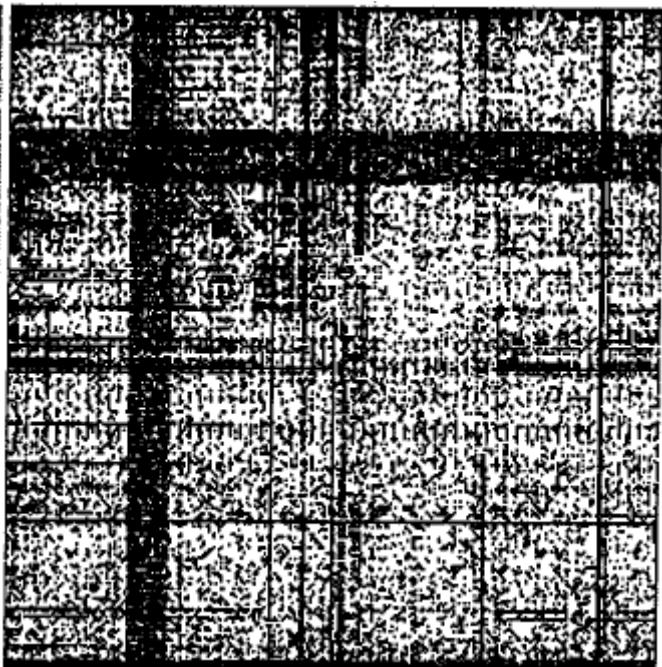


Рисунок 13 – Пример распределения на плоскости: результат отрицательный

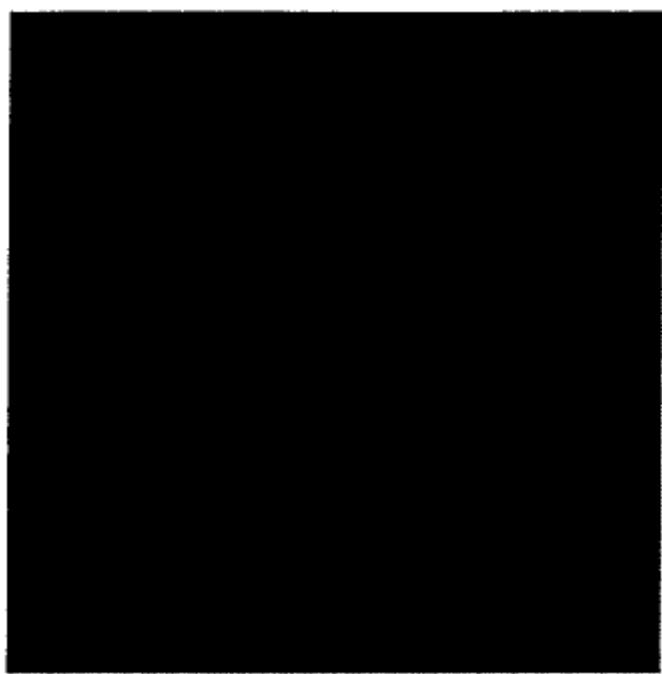


Рисунок 14 – Пример распределения на плоскости: положительный результат для последовательности большой длины

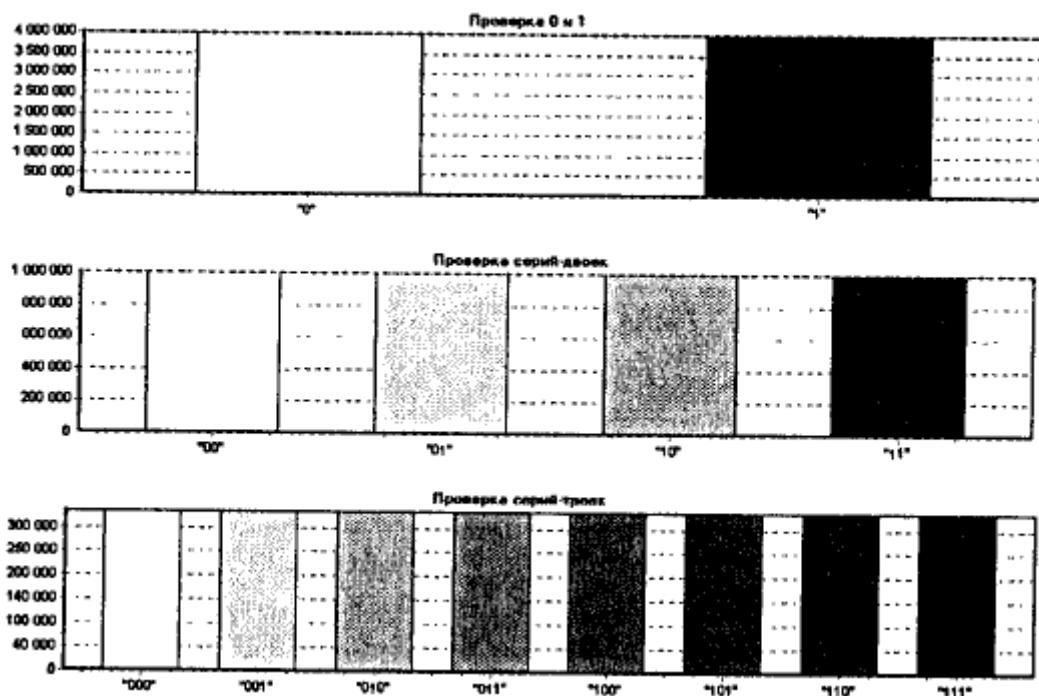


Рисунок 15 – Графическая проверка серий: результат положительный

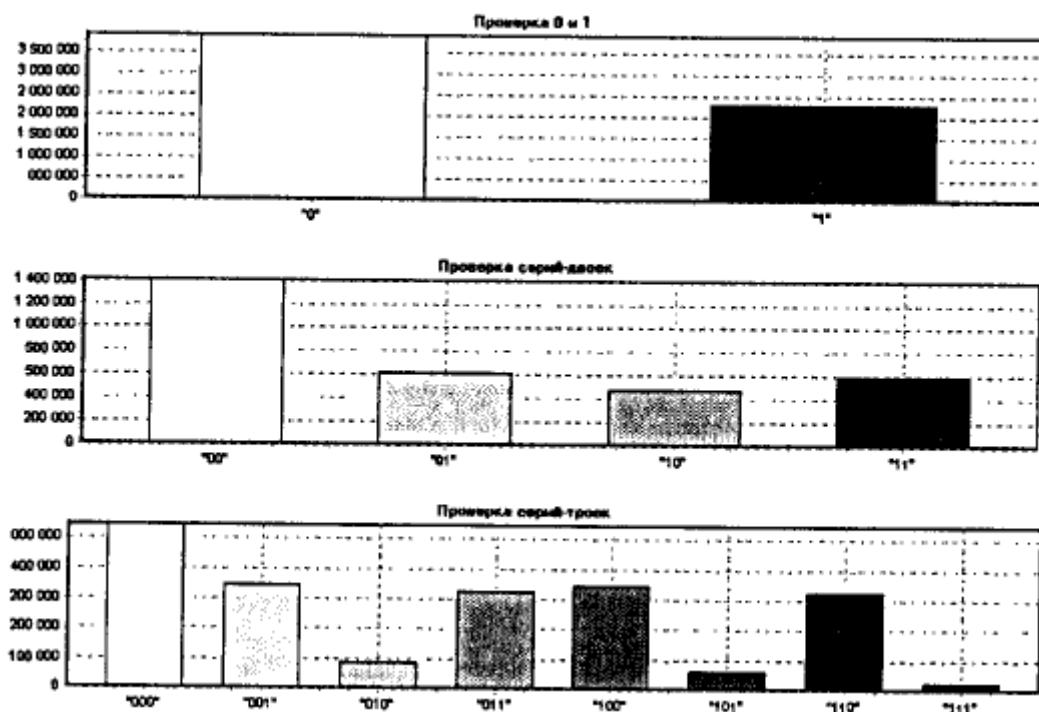


Рисунок 16 – Графическая проверка серий: результат отрицательный

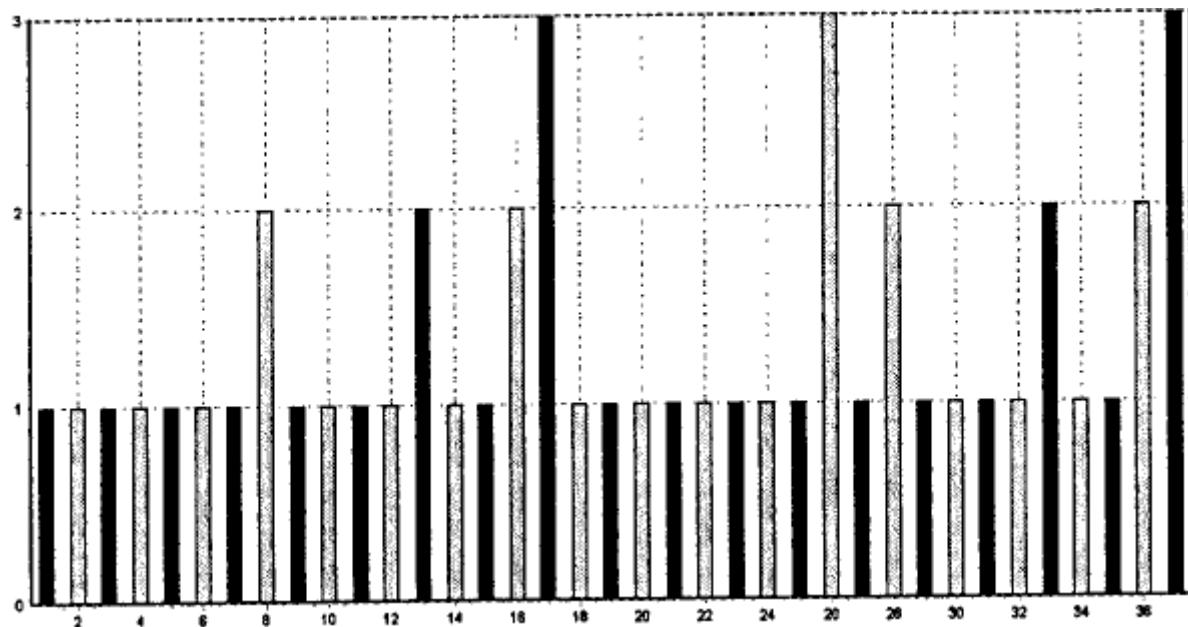


Рисунок 17 – Графическая проверка на монотонность: результат положительный

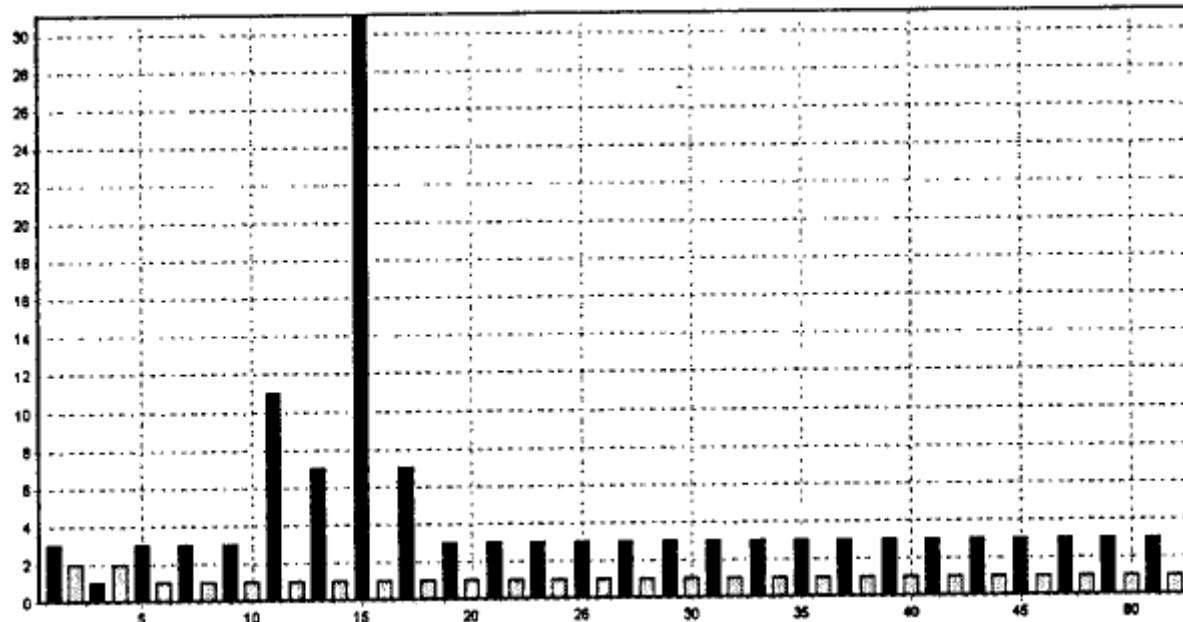


Рисунок 18 – Графическая проверка на монотонность: результат отрицательный

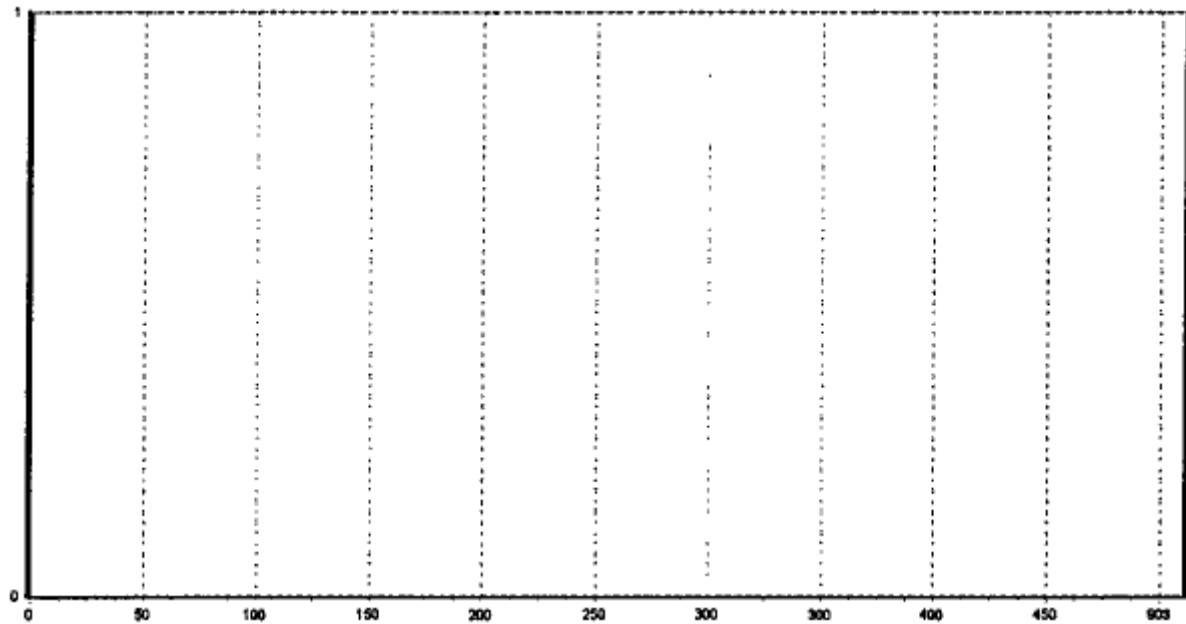


Рисунок 19 – АКФ: результат положительный

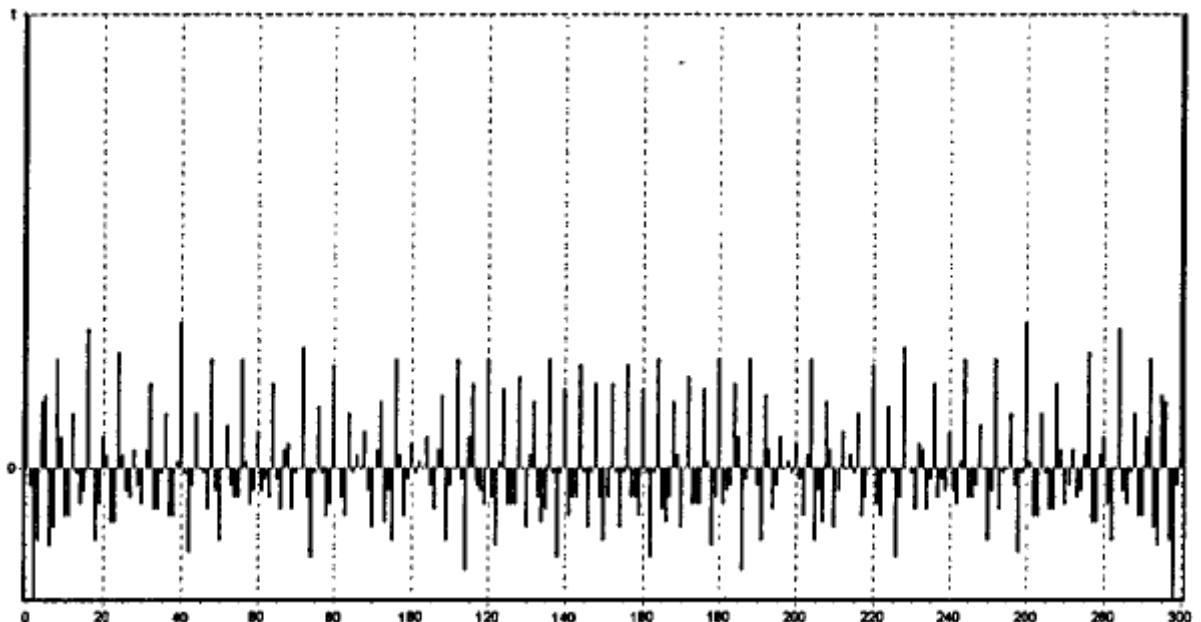


Рисунок 20 – АКФ: результат отрицательный

Таблица 4 – Значения  $\chi^2$

| $\nu \setminus \alpha$ | 0,99    | 0,98    | 0,95    | 0,90   | 0,80   | 0,70   | 0,50   | 0,30   | 0,20   | 0,10   | 0,05   | 0,02   | 0,01   |
|------------------------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1                      | 0,00016 | 0,00628 | 0,00393 | 0,0158 | 0,0642 | 0,148  | 0,455  | 1,074  | 1,642  | 2,706  | 3,841  | 5,412  | 6,635  |
| 2                      | 0,0201  | 0,0404  | 0,103   | 0,211  | 0,446  | 0,713  | 1,386  | 2,408  | 3,219  | 4,605  | 5,991  | 7,824  | 9,210  |
| 3                      | 0,115   | 0,185   | 0,352   | 0,584  | 1,005  | 1,424  | 2,366  | 3,605  | 4,642  | 6,251  | 7,815  | 9,837  | 11,345 |
| 4                      | 0,297   | 0,429   | 0,711   | 1,064  | 1,649  | 2,195  | 3,357  | 4,878  | 5,989  | 7,779  | 9,488  | 11,668 | 13,277 |
| 5                      | 0,554   | 0,752   | 1,145   | 1,610  | 2,343  | 3,000  | 4,351  | 6,064  | 7,289  | 9,236  | 11,070 | 13,388 | 15,086 |
| 6                      | 0,872   | 1,134   | 1,635   | 2,204  | 3,070  | 3,828  | 5,348  | 7,231  | 8,558  | 10,645 | 12,592 | 15,033 | 16,812 |
| 7                      | 1,239   | 1,564   | 2,167   | 2,833  | 3,822  | 4,671  | 6,346  | 8,383  | 9,803  | 12,017 | 14,067 | 16,622 | 18,475 |
| 8                      | 1,646   | 2,032   | 2,733   | 3,490  | 4,594  | 5,527  | 7,344  | 9,524  | 11,030 | 13,362 | 15,507 | 18,168 | 20,090 |
| 9                      | 2,088   | 2,532   | 3,325   | 4,168  | 5,380  | 6,393  | 8,343  | 10,656 | 12,242 | 14,684 | 16,919 | 19,679 | 21,666 |
| 10                     | 2,558   | 3,059   | 3,940   | 4,865  | 6,179  | 7,267  | 9,342  | 11,781 | 13,442 | 15,987 | 18,307 | 21,161 | 23,209 |
| 11                     | 3,053   | 3,609   | 4,575   | 5,578  | 6,989  | 8,148  | 10,341 | 12,899 | 14,631 | 17,275 | 19,675 | 22,618 | 24,725 |
| 12                     | 3,571   | 4,178   | 5,226   | 6,304  | 7,807  | 9,034  | 11,340 | 14,011 | 15,812 | 18,549 | 21,026 | 24,054 | 26,217 |
| 13                     | 4,107   | 4,765   | 5,892   | 7,042  | 8,634  | 9,926  | 12,340 | 15,119 | 16,985 | 19,812 | 22,362 | 25,472 | 27,688 |
| 14                     | 4,660   | 5,368   | 6,571   | 7,790  | 9,467  | 10,821 | 13,339 | 16,222 | 18,151 | 21,064 | 23,685 | 26,873 | 29,141 |
| 15                     | 5,229   | 5,985   | 7,261   | 8,547  | 10,307 | 11,721 | 14,339 | 17,322 | 19,311 | 22,307 | 24,996 | 28,259 | 30,578 |
| 16                     | 5,812   | 6,614   | 7,962   | 9,312  | 11,152 | 12,624 | 15,338 | 18,418 | 20,465 | 23,542 | 26,296 | 29,633 | 32,000 |
| 17                     | 6,408   | 7,255   | 8,672   | 10,085 | 12,002 | 13,531 | 16,338 | 19,511 | 21,615 | 24,769 | 27,587 | 30,995 | 33,409 |
| 18                     | 7,015   | 7,906   | 9,390   | 10,865 | 12,857 | 14,440 | 17,338 | 20,601 | 22,760 | 25,989 | 28,869 | 32,346 | 34,805 |
| 19                     | 7,633   | 8,567   | 10,117  | 11,651 | 13,716 | 15,352 | 18,338 | 21,689 | 23,900 | 27,204 | 30,144 | 33,687 | 36,191 |
| 20                     | 8,260   | 9,237   | 10,851  | 12,443 | 14,578 | 16,266 | 19,337 | 22,775 | 25,038 | 28,412 | 31,410 | 35,020 | 37,566 |
| 21                     | 8,897   | 9,915   | 11,591  | 13,240 | 15,445 | 17,182 | 20,337 | 23,858 | 26,171 | 29,615 | 32,671 | 36,343 | 38,932 |
| 22                     | 8,542   | 10,600  | 12,388  | 14,041 | 16,314 | 18,101 | 21,337 | 24,939 | 27,301 | 30,813 | 33,924 | 37,659 | 40,289 |
| 23                     | 10,196  | 11,293  | 13,091  | 14,848 | 17,187 | 19,021 | 22,337 | 26,018 | 28,429 | 32,007 | 35,172 | 38,968 | 41,638 |
| 24                     | 10,856  | 11,992  | 13,848  | 15,659 | 18,062 | 19,943 | 23,337 | 27,096 | 29,553 | 33,196 | 36,415 | 40,270 | 42,980 |
| 25                     | 11,524  | 12,697  | 14,611  | 16,473 | 18,940 | 20,867 | 24,337 | 28,172 | 30,675 | 34,382 | 37,652 | 41,566 | 44,314 |
| 26                     | 12,198  | 13,409  | 15,379  | 17,292 | 19,820 | 21,792 | 25,336 | 29,246 | 31,795 | 35,563 | 38,885 | 42,856 | 45,642 |
| 27                     | 12,879  | 14,125  | 16,151  | 18,114 | 20,703 | 22,719 | 26,336 | 30,319 | 32,912 | 36,741 | 40,113 | 44,140 | 46,963 |
| 28                     | 13,565  | 14,847  | 16,928  | 18,939 | 21,588 | 23,647 | 27,336 | 31,391 | 34,027 | 37,916 | 41,337 | 45,419 | 48,278 |
| 29                     | 14,256  | 15,574  | 17,708  | 19,768 | 22,475 | 24,577 | 28,336 | 32,461 | 35,139 | 39,087 | 42,557 | 46,693 | 49,588 |
| 30                     | 14,953  | 16,306  | 18,493  | 20,599 | 23,364 | 25,508 | 29,336 | 33,530 | 36,250 | 40,256 | 43,773 | 47,962 | 50,892 |