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New Codes Arising from Complete (k, n)- arcs in PG(3,17)

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Abstract

The main aim of this work is to find new codes arising from construct a complete (k , n) – arcs in PG(3,17), when n = 3,4,5 we take the union of some (k,n) – arcs. Furhtermore, when n = 6,7,8,…,307 by using matlab19B program (1) to found all construct a complete (k , n + 1) - arcs from complete (k , n) - arcs. We start with points index zero and unit point, which we call the basic points of table (points and planes), then we start adding points from the remaining points of install the points of the first arc until we get intersections through which deleted all points of the plane , then we repeat that method until we get the maximum complete (5220 ; 307) - arcs. Then we find the [k, n, d] q-code of each a complete (k , n) - arcs .

Keywords:
Algebraic geometry, construction a complete arcs, new codes

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1. INTRODUCTION

A projective space three dimensional over field K denoted by PG(3,K) if K = GF(q) and $q = p^h$, p is prime number, h integer consists of (q^3+q^2+q+1) points and plane and (q^2+q+1) lines incidence relation between them. A (k , n) - arc B in PG(3,q) is complete if there is no (k+1,n)-arc containing it. So, any maximal (k, n)-arc in PG(3,q) is complete. in PG(3,q) any line is on exactly q + 1 planes and any two planes are intersected in exactly q + 1 points. Also any two points are on exactly q + 1 planes. A linear [k, n, d] code B is an n-dimensional subspace of the K-dimensional v = v(k, q) v is vector space, d is minimum distance of the code which is the two different elements of B.The aim of this work is to find new codes arising from construct a complete (k, n) – arc in PG(3,17), when n = 3,4,5 , we take the union of some (k,n) - arcs ,also when n = 6,7,8,…,307 by using MATLAB_{19B} program (1),(2) To found all construct a complete (k , n + 1) - arcs from complete (k;n) - arcs we start with points index zero and unit point, which we call the basic points of table (points and planes) .

1.1 Definition: [4].

A plane ϕ in PG(3,q) is a set of all points $p(z_1, z_2, z_3, z_4)$ satisfying a linear equation $w_1 z_1 + w_2 z_2+w_3 z_3+w_4 z_4 = 0$ this plane is denoted by $\phi[w_1,w_2, w_3, w_4]$, where z_1, z_2, z_3, z_4 are elements in GF(q) with the exception of quadrable consisting of four zero element.

1.2 Definition: [5],[6].

For any two code words, the minimum distance (Hamming distance) between c_1 and, c_2 is denoted by $d\,(c_1 , c_2)$ and it is defined to be the number of positions in which the corresponding coordinates different. The minimum distance of C is $d\,C = \min \{d\, c_1 , c_2 ; c_1 , c_2 \in C, c_1 \neq c_2 \}$.

1.3 Theorem:[8].

In PG(3;q) every plane contains exactly $q^2 + q + 1$ points and every point also exactly $q^2 + q + 1$ Plane.1.4 Theorem: [8],[10].The points of PG(3,q) have unique forms ; which are (1,0,0,0), $(y_1,1,0,0)$, $(y_1,y_2,1,0)$ and $(y_1,y_2,y_3,1)$ for all y_1,y_2,y_3 in GF(q) . Which are (1,0,0,0) is on point, $(y_1,1,0,0)$ are q point $(y_1,y_2,1,0)$ are q^2 point, and $(y_1,y_2,y_3,1)$ are q^3 point, for all y_1,y_2,y_3 in PG(q).

2. Code and a complete (k , n) – arcs

2.1 Definition: [8],[3]

A(k ,n)-arcs in PG(3, p) is a set of k points such that at most n points of which lie in any plane, $n \geq 3$ n is called degree of the (k ,n) – arcs.

2.2 Definition:[9],[7]

If k is any k-set in PG(3, P) , then an i-secant of K is a line (a plane) L such that $|L \cap K|$ =i external line (plane) of k is 0 –secant , a unisecant line (plane) is line (plane) is 1 –secant, a bisecant line is 2 – secant, a trisecant line is 3 –secant .

2.3 Definition:[1],[2].

Let (M_1 , n) –arc A type (T_i ; T_{i-1};…;T_0) and (M_2, n) –arc B type (S_i ; S_{i-1}; …;S_0) thenA and B have the same type if only if $T_i = S_i$ for all i in this case they are projectively equivalent .

2.4 Theorem:[1],[2].

A (k,n)-arc C is maximum iff, every line in PG(3,q) is a 0-secant or n-secant.

3. Algorithm

Algorithm from constructing a complete arcs from n= 3 and find codes for PG(3,17) using $MATLAB_{19B}$ program(2):

. We start proving the basic points on Table(1) whose point is1(1,0,0,0) ,2(0,1,0,0),19(0,0,1,0),308(0,0,0,1),615(1,1,1,1) for PG(3;17). **.**

. Test index zero points N_0 from the planes that contain tree secant, if $N_0 = 0$ then arc is a complete ,if $N_0 \neq 0$ we add some point of index zero.The union basic point and add point we get a complete arcs ,the remaining arcs are constructed using the same algorithm as above.

. after getting a complete arcs we start arising codes where d = k – n.

3.1 construction of the complete (k , n) – arcs in PG(3,17)• The Projective Space PG(3,17):

By above theorems The Projective Space PG(3,17) contain (5220) points, each point is on (307) planes also the PG(3,17) contain (5220) planes every plane contains (307) points ,any lines contain (18)points which is the intersection of (18) planes. Constructed a complete(k , n) – arc in PG(3,17) , where $3 \leq n \leq 307$, ($q^2 + q + 1 = 307$) .And find linear code from Table (4).

3.2 The construction of the complete (k,3) – arcs in PG(3,17):

Let Ά={1,2,19,308,615}where 1(1,0,0,0) 2(0,1,0,0) , 19(0,0,1,0), 308(0,0,0,1) ,615(1,1,1,1)This point in PG(3,17) is called the reference and unit point Ά is a(5,3) –arc since Ά intersects any plane in at most three points. Ά is incomplete Arc because

Table (1): point and plane of PG(3,17)

I	p_i	**π**				
1	(1,0,0,0)	2	19	36	53	70
			87	104	121	138
			155	172	189	206
			223	240	257	274
			291	308	325	342
			359	376	393	410
			427	444	461	478
			495	512	529	546
			563	580	597	614
			631	648	665	682
			699	716	733	750
			767	784	801	818
			835	852	869	886
			903	920	937	954
			971	988	1005	1022
			1039	1056	1073	1090
			1107	1124	1141	1158
			1175	1192	1209	1226
			1243	1260	1277	1294
			1311	1328	1345	1362
			1379	1396	1413	1430
			1447	1464	1481	1498
			1515	1532	1549	1566
			1583	1600	1617	1634
			1651	1668	1685	1702
			1719	1736	1753	1770
			1787	1804	1821	1838
			1855	1872	1889	1906
			1923	1940	1957	1974
			1991	2008	2025	2042
2	(0,1,0,0)	1	19	20	21	22
			23	24	25	26
			27	28	29	30
			31	32	33	34
			35	308	309	310
			311	312	313	314
			315	316	317	318
			319	320	321	322
			323	324	597	598
			599	600	601	602
			603	604	605	606
			607	608	609	610
			611	612	613	886
			887	888	889	890
			891	892	893	894
			895	896	897	898
			899	900	901	902
			1175	1176	1177	1178
			1179	1180	1181	1182
			1183	1184	1185	1186
		438	454	470	486	502
			518	534	550	566
			582	597	630	646
			662	678	694	710
			726	742	758	774
			790	806	822	838
		854	870	902	918	
		934	950	966	982	998
			1014	1030	1046	1062
			1078	1094	1110	1126
			1142	1158	1190	1206
			1222	1238	1254	1270
			1286	1302	1318	1334

I	p_i	π			
		1350	1366	1382	1398
		1414	1430	1463	1478
		1494	1510	1526	1542
		1558	1574	1590	1606
		1622	1638	1654	1670
		1686	1702	1735	1751
		1766	1782	1798	1814
		1830	1846	1862	1878
		1894	1910	1926	1942
		1958	1974	2007	2023
		2039	2054	2070	2086
		2102	2118	2134	2150
		2166	2182	2198	2214
		2230	2246	2279	2295
		2311	2327	2342	2358
		2374	2390	2406	2422
		2438	2454	2470	2486
		2502	2518	2551	2567
		2583	2599	2615	2630
		2646	2662	2678	2694
		2710	2726	2742	2758
		2774	2790	2823	2839
5220		2855	2871	2887	2903
		2918	2934	2950	2966
		2982	2998	3014	3030
	(16,16,16,1)	3046	3062	3095	

there exist point of index zero for it which are given in Table (1) we get it from MATLAB$_{19B}$. After deleting the planes on which triple intersections lie, we add from the remaining points the following points{ 941, 1214,1558,1829} to Ά make it complete(9,3) -arcɃ, Ƀ = Ά ∪ { 941,1214, ,1558,1829}= { 1, 2 ,19 , 308 615,941 , 1214,1558 ,1829}.

3.3 The construction of the complete (k,4) – arcs in PG(3,17):

(k ,4) – arcs could be constructed by adding in each time to Ƀ one point from remaining (5211) point. We add the smallest point for Ƀ and denote it by Ƀ$_1$ then point to a plane and delete the triple intersections, then we repeat the above process for the rest of the points until we have reached by adding the point(5211) that represents the smallest remaining point of PG(3,17) we get the following:Ƀ$_1$ = Ƀ ∪{3}, Ƀ$_2$ = Ƀ ∪{4} ,Ƀ$_3$ = Ƀ ∪{5}, . . . , Ƀ$_{11}$ = Ƀ ∪{13}, Ƀ$_{12}$ = Ƀ ∪{14},Ƀ$_{13}$ = Ƀ ∪{15}. . .. Ƀ$_{17}$ = Ƀ ∪{20}, ...,Ƀ$_{304}$ = Ƀ ∪{307}, ... Ƀ$_{306}$ = Ƀ ∪{400}, ... ,Ƀ$_{500}$ = Ƀ ∪{504},. . Ƀ$_{610}$ = Ƀ ∪{614}, ..., Ƀ$_{5211}$ = Ƀ ∪{5220}By using MATLAB$_{19B}$ we found the intersection of the (k,4) – arcs and found equivalent (k,4) - arcs projectively for the arcs, Ƀ$_1$,....., Ƀ$_{5211}$ by the definition(2.3).we founded only sixteen projectively distinct (10,4) – arc which are:

Table (2) explain the distinct projective from (k;4) - arc

I	Bi									
1	1	2	3	19	308	615	941	1214	1558	1829
2	1	2	4	19	308	615	941	1214	1558	1829
3	1	2	5	19	308	615	941	1214	1558	1829
5	1	2	7	19	308	615	941	1214	1558	1829
25	1	2	19	28	308	615	941	1214	1558	1829
34	1	2	19	37	308	615	941	1214	1558	1829
35	1	2	19	38	308	615	941	1214	1558	1829
36	1	2	19	39	308	615	941	1214	1558	1829
37	1	2	19	40	308	615	941	1214	1558	1829
40	1	2	19	43	308	615	941	1214	1558	1829
41	1	2	19	44	308	615	941	1214	1558	1829
58	1	2	19	61	308	615	941	1214	1558	1829
62	1	2	19	65	308	615	941	1214	1558	1829
162	1	2	19	165	308	615	941	1214	1558	1829
279	1	2	19	282	308	615	941	1214	1558	1829
1543	1	2	19	308	615	941	1214	1550	1558	1829

Table(3) explain intersection plane

T_0	T_1	T_2	T_3	T_4
2834	1817	465	93	11
2833	1821	459	97	10
2831	1829	447	105	8
2832	1825	453	101	9
2830	1833	441	109	7
2835	1813	471	89	12
2850	1770	510	80	10
2845	1790	480	100	5
2847	1782	492	92	7
2848	1778	498	88	8
2846	1786	486	96	6
2844	1794	474	104	4
2843	1798	468	108	3
2842	1802	462	112	2
2841	1806	456	116	1
2836	1809	477	85	13

1. $Ƀ_1$ incomplete arc because there are exists points of index zero which are.(shown in Table(1)). When you add points from remaining points in index zero to $Ƀ_1$ { 2043, 2348,2659 2983, 3295, 3549, 4039} we get complete (17,4) – arcs $Є_1$,then $Є_1$ = $Ƀ_1$ ∪ { 2043, 2348, 2659,2983, 3295,3549, 4039 }$Є_1$={ 1, 2 , 3, 19, 308 ,615 , 941,1214, 1558, 1829 ,2043 , 2348 , 2659 , 2983 ,3295 , 3549, 4039}2. $Ƀ_2$ incomplete arc because there are exists points of index zero (Shown in Table(1)) .When you added these points {2043 , 2348, 2660 2980 , 3252 , 3597 , 3933} to $Ƀ_2$ it will be is complete (17,4) – arcs $Є_2$,then $Є_2$= $Ƀ_2$ ∪ { 2043 2348 , 2660 , 2980 , 3252 , 3597, 3933} $Є_2$ = { 1 , 2 , 4 , 19 , 308 , 615 , 941 , 1214 , 1558 1829 2043 ,2348 ,2660 , 2980 , 3252 , 3597, 3933}3. $Ƀ_3$ incomplete arc because there are exists points of index zero which are.(shown in table(1)) .When you added these points{ 2042 , 2353 , 2655 2983 , 3257 , 3642 , 3944} to $Ƀ_3$ it will be is complete (17,4) – arcs $Є_3$,then $Є_3$= $Ƀ_3$ ∪ { 2042 , 2353 , 2655 ,2983 ,3257 ,3642 ,3944}$Є_3$ = { 1 , 2 , 5 , 19 , 308 , 615 , 941 , 1214 , 1558 1829 ,2042 ,2353 ,2655 ,2983 ,3257 , 3642,3944 }4. $Ƀ_5$ incomplete arc because there are points of index zero which are.(shown in table(1)) .When you added these points{ 2042,2351,2657 2982 , 3259 , 3642 , 4483} to $Ƀ_5$ it will be is complete (17,4) – arcs $Є_4$,then $Є_4$= $Ƀ_5$ ∪ {2042 2351,2657,2982,3259,3642,4483 }$Є_4$ = { 1,2 , 7 , 19 , 308 , 615 ,941,1214,1558, 1829 2042 , 2351 , 2657 , 2982 , 3259,3642,4483 }5. $Ƀ_{25}$ incomplete arc because there are points of index zero which are.(shown in table(1)) .When you added these points {410,719,1027, 1346 1631 , 2037 , 2311} to $Ƀ_{25}$ it would be complete (17,4) – arcs $Є_5$, then $Є_5$ = $Ƀ_{25}$ ∪ { 410 , 719 , 1027 1346 , 1631 , 2037 , 2311 } $Є_5$ = { 1 , 2 , 19 , 28 , 308 , 410 , 615 , 719 , 941 , 1027 , 1214 , 1346 , 1558 ,1631 , 1829,2037 2311}6. $Ƀ_{34}$ incomplete arc because there are points of index zero which are.(shown in table(1)) .When you added these points { 343 , 648 , 891 , 1200 , 1596 , 1891 , 2321} to $Ƀ_{34}$ will be is complete (17,4) – arcs $Є_6$, then $Є_6$ = $Ƀ_{34}$ ∪ { 343 648 , 891 , 1200 , 1596 , 1891 , 2321}$Є_6$ = { 1 , 2 , 19 , 37 , 308 , 343 , 615 , 648 , 891 941, 1200 , 1214 , 1558 , 1596 , 1829 ,1891, 2321}7. 6. $Ƀ_{35}$ incomplete arc because there are points of index zero which are.(shown in table(1)) .When you added these points {347,648 ,892,1205 1646 , 1930 , 2289 } to $Ƀ_{35}$ will be is complete(17,4) – arcs $Є_7$, then $Є_7$ = $Ƀ_{35}$ ∪ { 347 , 648 , 892 , 1205 , 1646 , 1930 , 2289}$Є_7$ = { 1 , 2 , 19 , 38 , 308 , 347 ,615 , 648 ,892 ,941 1205, 1214, 1558, 1646 , 1829 , 1930 , 2289}8. $Ƀ_{36}$ incomplete arc because there are points of index zero which are.(shown in table(1)) .When you added these points {342, 654,887,1208 1596 , 1898 , 2220 ,2999} to $Ƀ_{36}$ will be iscomplete (18,4) – arcs $Є_8$, then $Є_8$ = $Ƀ_{36}$ ∪ { 342, 654 ,887 ,1208 , 1596 ,1898 , 2220, 2999 }$Є_8$ = {1,2 ,19 ,39 ,308 ,342 ,615 ,654 ,887, 941, 1208 , 1214 , 1558 , 1596,1829 ,1898,2220 ,2999 }

9. $Ƀ_{37}$ incomplete arc because there are points of index zero which are.(shown in table(1)) .When you added these points {343,648,888, 11991590,1891,2305}to $Ƀ_{37}$ will be is complete(17,4) - arcs $Є_9$, then $Є_9$ = $Ƀ_{37}$ ∪ {343,648 ,888,

1199,1590,1891, 2305},Ꞓ $_{9}$ = {1,2 ,19,40,308,343,615 ,648,888,941,1199 , 1214 , 1558 , 1590 1829 1891 , 2305}10. Ƀ$_{40}$ incomplete arc because there are points of index zero which are.(shown in table(1)) .When you added these points{342, 651,889, 1194 1585,1893,2287} to Ƀ$_{40}$ will be is complete (17,4) – arcs Ꞓ$_{10}$, then Ꞓ$_{10}$ = Ƀ$_{40}$ ∪{342,651, 889, 1194 1585, 1893, 2287},Ꞓ$_{10}$ = { 1, 2,19,43,308,342, 615 651, 889, 941,1194,1214,1558,1585,1829,1893 2287}.11. Ƀ$_{41}$ incomplete arc because there are points of index zero which are.(shown in table(1)) . When you added these points {343,650,889,1192 1586, 1891, 2713, 4502} to Ƀ$_{41}$ will be is complete(18,4) – arcs Ꞓ$_{11}$, then Ꞓ$_{11}$ = Ƀ$_{41}$∪{ 343, 650, 889, 1192,1586,1891,2713, 4502}Ꞓ$_{11}$ = {1,2,19,44,308, 343, 615},Ꞓ$_{11}$={1,2,19,44,308, 343, 615, 650, 889941,1192,1214,1558,1586,1829,1891,2713, 4502}12. Ƀ$_{58}$ incomplete arc because there are points of index zero which are.(shown in table(1)) . When you added these points { 309, 650, 905, 1243, 1622, 1892, 2293} to Ƀ$_{58}$ will be is complete (17,4) – arcs Ꞓ12, then Ꞓ12= Ƀ58∪{ 309, 650,905 1243,1622,1892,2293},Ꞓ12 = {1,2,19, 61,308, 309 615,650,905,941,1214, 1243,1558,1622,1829,1892 2293}13. Ƀ$_{62}$ incomplete arc because there are points of index zero which are.(shown in table(1)) .When you added these points{309, 648,905, 1245 1622,1968, 2288, 2871} to Ƀ$_{62}$ will be is complete (18,4) – arcs Ꞓ$_{13}$, then Ꞓ$_{13}$ = Ƀ$_{62}$∪{ 309, 648, 905, 1245, 1622, 1968, 2288, 2871},Ꞓ$_{13}$ ={1, 2, 19, 65308, 309, 615, 648, 905, 941, 1214, 1245 , 1558,1622, 1829,1968, 2288,2871 } 14. Ƀ$_{162}$ incomplete arc because there are points of index zero which are.(shown in table(1)) . When you added these points 309, 631, 906, 1269, 1622, 1817, 2513 to Ƀ$_{162}$ will be is complete (17,4) – arcs Ꞓ$_{14}$, then Ꞓ$_{14}$= Ƀ$_{162}$ ∪ { 309, 631, 906, 1269, 1622, 1817, 2513},Ꞓ$_{14}$ = { 1, 2, 19, 165,308, 309, 615,631,906,941,1214,1269,1558,1622,1817,1829,2513}15. Ƀ$_{279}$ incomplete arc because there are points of index zero which are.(shown in table(1)) . When you added these points {282, 309, 631, 9051265, 1661, 1892, 2287} to Ƀ$_{279}$ will be is complete (17,4) – arcs Ꞓ$_{15}$, then Ꞓ$_{15}$ = Ƀ$_{279}$∪{282 ,309, 631 905, 1265, 1661, 1892, 2287},Ꞓ$_{15}$ = { 1, 2, 19 , 282308,309, 615,631,905, 941,1214, 1265, 1558, 1661 1829,1892,2287}16. Ƀ$_{1543}$ incomplete arc because there are points of index zero which are.(shown in table(1)) .When you added these points {54, 345, 603, 957, 1192,1550,2021,2619} to Ƀ$_{1543}$ will be is complete (17,4) – arcs Ꞓ$_{16}$, then Ꞓ$_{16}$ = Ƀ$_{1543}$ ∪ {54, 345, 603, 957,1192,1550, 2021,2619},Ꞓ$_{16}$ = {1,2,19,54, 308, 345,603,615, 941,957,1192, 1214,1550,1558, 1829, 2021,2619 } .

3.4 The construction of the complete (k,5) – arcs in PG(3,17):

From (k,4) – arcs exists sixteen complete arcs which are:The arcs Ꞓ$_{1}$, Ꞓ$_{2}$, Ꞓ$_{3}$, Ꞓ$_{4}$, Ꞓ$_{5}$, Ꞓ$_{6}$, Ꞓ$_{7}$, Ꞓ$_{9}$, Ꞓ$_{10}$, Ꞓ$_{12}$, Ꞓ$_{14}$, Ꞓ$_{15}$, Ꞓ$_{16}$ projectively equivalent when we choose the union of any two arcs , it is not possible to achieve the largest number complete (k,5) –arcs because there are some point on coplanar , now we choose which one to be Ꞓ$_{15}$ when adding (This point from remaining point on index zero){3, 2044, 2348, 2371, 2683, 2689, 2970, 3064,3615470} to Ꞓ$_{15}$ its get a complete (27 , 5) – arc Ɣ$_{15}$Ɣ$_{15}$ = Ꞓ$_{15}$ ∪ {3,2044,2348,2371, 2683, 2689, 2970 3064,3615,4740} to be Ꞓ$_{15}$,Ɣ$_{15}$ ={1,2,3,19,282,308 309, 615,631, 905, 941, 1214, 1265, 1558, 1661 1829,1892,2044,2287,2348,2371,2683,2689,29703064,3615 ,4740} is a complete(27,5) -arcs Same case for Ꞓ$_{8}$, Ꞓ$_{11}$, Ꞓ$_{13}$ projectively equivalent when we choose the union of any two arcs ,it is not possible to achieve the largest number complete (k,5) –arc because there are some point on coplanar now we choose which one to be Ꞓ$_{13}$ when adding { 3, 2042, 2351, 2370, 2669,2962,3073,3483,5176} to Ꞓ$_{13}$ its get a complete (27 , 5) – arc Ɣ$_{13,}$ Ɣ$_{13}$ = Ꞓ$_{13}$ ∪{ 3 , 2042, 2351, 2370, 2669, 2962, 3073, 3483,5176}, Ɣ$_{13}$ = { 1,2,3,19,65, 308, 309,615, 648, 905941,1214, 1245, 1558,1622, 1829,1968,2042,22882351,2370,2669,2871,2962,3073,3483 ,5176}

3.5 The construction of the complete(k,6) – arc in PG(3,17):

In construct a complete (k,5) - arcs we get two complete projectively equivalent arcs they are(27, 5) - arc Ɣ$_{15}$ and (27, 5) – arc Ɣ$_{13}$ when weConstruct a complete (k,6) - arc choose one of them to say Ɣ$_{15}$ then we add the following points {4,3202, 3504, 3523, 3828, 3862, 4192, 4204, 4442, 5054}, Ꞓ$_{6}$ = Ɣ$_{15}$∪ {4,3202, 3504, 3523, 3828, 3862, 4192, 4204, 4442, 5054}, to it and we get complete (37,6) - arcs Ꞓ$_{6}$.

3.6 The construction of the complete (k,7) – arcs in PG(3,17):

A complete (k,7) - arcs Ꞓ$_{7}$ by adding four points are 5,4354,,4664,4678 to construct from the complete(37,6) - arc Ꞓ$_{6}$, Ꞓ$_{7}$ = Ꞓ$_{6}$ ∪ { 5,4354,,4664,4678 }Ꞓ$_{7}$ = {1,2,3,4,5,19,38,308,347,615,648,892,9411205,1214,1558,1 646,1829,1930,2042,2289, 23512366,2673, 2694,2979,3030,3200,3216,3521,35853828,3984,4162,4164 ,4354,4586,4663,4678,4985,5003 } we get complete (41,7) - arc Ꞓ$_{7}$.

3.7 The construction of the complete(k,n) - arc when 8 ≤ n ≤ 307 in PG(3,17):

Construct the remaining arcs, it will be as follows:- Construct the remaining arc of the complete(k , n + 1) – arcs in PG(3,17), 8 ≤ n ≤ 307 That would found complete (k , n) – arcs. We add some point of index zero.- When complete (k,7) - arcs satisfies the condition for the largest number of the secants but it does notcontain coplanar points. We choose complete (k;7) - arc to construct the complete (k,8) - arcs, and so the remaining arcs , he following explain in Table (4) by using MATLAB$_{19b}$ program(1), such that we take a complete (k,8) - arc by adding one point to the complete (41, 7) -arcs we get complete (42,8) - arcs where k =41 After constructing complete (k,n) –arcs, we strat to find new codes. A linear $[k ,n,d]_{q}$ -code C over a finite field is subspace of dimension k of the $n-$ dimensional vector space $V\ n$, $q = Fq\ n$ such that any two distinct vectors in C differ in at least of d places. The elements of the code are called code words. Moreover, the parameters n, k and d are called length,dimension,and minimum distance of C. Let ℓ be a $[k,n,d]_q$ - code; that is, ℓ is linear of length k, dimension n and minimum distanced=d(ℓ). If d = k − n+1, then ℓ is maximum distance.There exists a relationship between (k ,n) - arcs in and $[k,n,d]_q$ - code. We strat to find $[k,n,d]_q$ - codefrom complete (k,3) - arc , k = 9 new code arising$[9,4,5]_{17}$ - code, in complete (k,4) - arcs there are sixteen distinct projective complete arcs. We take complete (k,n) -arcs from among the complete arcs projectively equivalent (17,4) - arcs, k = 17 new code arising $[17,4,13]_{17}$ - code and the other (18,4) - arc , k = 18 new code arising $[18,4,14]_{17}$ - code .in construct complete (k,5) - arc there are two complete arcs projectively equivalent. We choose one of them to be (27,5) - arc , k = 27 new code arising $[27,4,22]_{17}$ - code , and (k,6) - arc construct complete (37,6) - arc, k = 37 new code arising $[37,4,31]_{17}$ - code. A complete (41,7) - arc new code arising $[41 , 4 , 34]_{17}$ - code. The remaining new code arising constuct a complete (k,n) - arcs from$8 \leq n \leq 307$ in PG(3,17) in same Table(4) of construct complete (k,n) - arcs .An illustration of the Table(4) below, then finding the complete arcs by adding the points to the index zero , as well as then finding the codes for that arcs to find d is minimum distance of the code which two different elements, where d = k - n The results are as shown in the last column of the Table(4).

Table(4) :construct acomplete arcs and new codes

A complete (k ; n) – arcs	**a complete (k,n+1) - arcs**	**[k, n ,d] – codes**
(41 ; 7) – arc	(42 ; 8) – arc	[42,4,34] – code
(42 ; 8) – arc	(43 ; 9) – arc	[43,4,34] – code
(43 ; 9) – arc	(44 ;10) – arc	[44,4,34] – code
(44; 10) – arc	(45 ;11) – arc	[45,4,34] – code
(45; 11) – arc	(46 ;12) - arc	[46,4,34] – code
(46 ;12) – arc	(47 ;13) - arc	[47,4,34] – code
(47 ;13) - arc	(48 ;14) – arc	[48,4,34] – code
(48 ;14) – arc	(49 ;15) – arc	[43,4,34] – code
(49 ;15) – arc	(50 ;16) – arc	[50,4,34] – code
(50 ;16) – arc	(51 ;17) – arc	[51,4,34] – code
(51 ;17) – arc	(52 ;18) – arc	[52,4,34] – code
(52 ;18) – arc	(53 ;19) – arc	[53,4,34] – code
(53 ;19) – arc	(54 ;20) – arc	[54,4,34] – code
(54 ;20) – arc	(72 ;21) – arc	[72,4,51] - code
(72 ;21) – arc	(90 ; 22) –arc	[90,4,68] - code
(90 ; 22) –arc	(108;23) –arc	[108,4,85] - code
(108;23) –arc	(126;24) – arc	[126,4,102] -code
(126;24) – arc	(144;25) –arc	[144,4,119]-cod
(144;25) –arc	(162;26) –arc	[162,4,136]-cod
(162;26) –arc	(180; 27) –arc	[180,4,153] - code
(180; 27) –arc	(198 ;28) –arc	[198,4,170]- cod
(198 ;28) –arc	(216 ;29) –arc	[216,4,187] - code
(216 ;29) –arc	(234;30 –arc	[234,4,204] - code
(234;30 –arc	(252;31) –arc	[252,4,221] -code
(252;31) –arc	(270;32) –arc	[270,4,238] -code
(270;32) –arc	(288;33) –arc	[288,4,255] -code
(288;33) –arc	(306;34) –arc	[306,4,272] -code
(306;34) –arc	(324;35) –arc	[324,4,289] -code
(324;35) –arc	(342;36) –arc	[342,4,306] –code
(342;36) –arc	(360;37) –arc	[360,4,323] -code
(360;37) –arc	(377,38) –arc	[377,4,339] -code
(377,38) –arc	(393;39) -arc	[393,4,354] -code
(393;39) -arc	(410;40) –arc	[410,4,370] -code

A complete (k ; n) – arcs	a complete (k,n+1) - arcs	[k, n ,d] – codes
(410;40) –arc	(427;41) –arc	[427,4,386] -code
(427;41) –arc	(444;42) –arc	[444,4,402] -code
(444;42) –arc	(460;43) –arc	[460,4,417] –code
(460;43) –arc	(476;44) –arc	476,4,432] –code
(476;44) –arc	(493;45) –arc	493,4,448] –code
(493;45) –arc	(509;46) –arc	509,4,463] -code
(509;46) –arc	(525;47) –arc	525,4,478] –code
(525;47) –arc	(539;48) –arc	[539,4,491]–cod
(539;48) –arc	(553;49) –arc	553,4,504] –code
(553;49) –arc	(566;50) –arc	566,4,516] –code
(566;50) –arc	(579,51) –arc	579,4,528] –code
(579,51) –arc	(594,52) –arc	594,4,542] –code
(594,52) –arc	(609;53) –arc	[609,4,556] –code
(609;53) –arc	(623;54) –arc	[623,4,569] –code
(623;54) –arc	(637;55) –arc	[637,4,582] –code
(637;55) –arc	(651;56) –arc	[651,4,595] –code
(651;56) –arc	(665;57) –arc	[665,4,608] –code
(665;57) –arc	(680;58) –arc	[680,4,622] –code
(680;58) –arc	(694;59) –arc	[694,4,635] –code
(694;59) –arc	(709;60) –arc	[709,4,649] –code
(709;60) –arc	(724;61) –arc	[724,4,663] –code
(724;61) –arc	(739;62) –arc	[739,4,677] –code
(739;62) –arc	(753;63) –arc	[753,4,690] –code
(753;63) –arc	(767;64) –arc	[767,4,703] –code
(767;64) –arc	(781;65) –arc	[781,4,716] –code
(781;65) –arc	(796;66) –arc	[796,4,730] –code
(796;66) –arc	(812;67) –arc	[812,4,745] - code
(812;67) –arc	(825;68) –arc	[825,4,757] –code
(825;68) –arc	(838;69) –arc	[838,4,769] –code
(838;69) –arc	(852;70) –arc	[852,4,782] –code
(852;70) –arc	(865;71) –arc	[865,4,794] –code
(865;71) –arc	(880;72) –arc	[880,4,808] –code
(880;72) –arc	(893;73) –arc	[893,4,820] –code
(893;73) –arc	(906;74) –arc	[906,4,832] –code
(906;74) –arc	(920;75) –arc	[920,4,845] –code
(920;75) –arc	(934;76) –arc	[934,4,858] –code
(934;76) –arc	(948;77) –arc	[948,4,871] –code
(948;77) –arc	(962,78) –arc	[962,4,884] –code
(962,78) –arc	(974;79) –arc	[974,4,895] –code
(974;79) –arc	(988;80) –arc	[988,4,908] –code
(988;80) –arc	(1000,81) –arc	[1000,4,919] –code
(1000,81) –arc	(1012;82)–arc	[1012,4,919] –code
(1012;82) - arc	(1025;83) –arc	[1025,4,942] code
(1025;83) –arc	(1038,84) –arc	[1038,4,954] –code
(1038,84) –arc	(1051;85) –arc	[1051,4,966] –code

A complete (k ; n) – arcs	**a complete (k,n+1) - arcs**	**[k, n ,d] – codes**
(1051;85) –arc	(1064,86) –arc	[1064,4,978] –code
(1064,86) –arc	(1077;87) –arc	[1077,4,990] –code
(1077;87) –arc	(1089;88) –arc	[1089,4,1001]-code
(1089;88) –arc	(1103;89) –arc	[11089,4,1014]-code
(1103;89) –arc	(1119,90) –arc	[1119,4,1029] -code
(1119,90) –arc	(1136;91) –arc	1136,4,1045] -code
(1136;91) –arc	(1152;92) –arc	[1152,4,1060] –code
(1152;92) –arc	(1164;93) -arc	[1164,4,1071] –code
(1164;93) -arc	(1177;94) –arc	[1177,4,1083] –code
(1177;94) –arc	(1190;95) –arc	[1190,4,1095] -code
(1190;95) –arc	(1205;96) –arc	[1205,4,1109] -code
(1205;96) –arc	(1218;97) –arc	[1218,4,1121] –code
(1218;97)-arc	(1233;98)-arc	[1233,4,1135]–cod
(1233;98) –arc	(1247;99) –arc	[1247,4,1148]– cod
(1247;99) –arc	(1261;100) –arc	[1261,4,1161] - code
(1261;100) –arc	(1274;101) –arc	1274,4,1173] -code
(1274;101) –arc	(1287;102) –arc	1287,4,1185] –code
(1287;102) –arc	(1300;103) –arc	1300,4,1197] –code
(1300;103) –arc	(1314;104) –arc	1314,4,1210] –code
(1314;104)arc	(1329;105) –arc	[1329,4,1224] -code
(1329;105) –arc	(1343;106) –arc	1343,4,1227] –code
(1343;106) –arc	(1360;107) –arc	1360,4,1253] –code
(1360;107) –arc	(1375;108) –arc	1375,4,1267] –code
(1375;108) –arc	(1390;109) –arc	1390,4,1281] –code
(1390;109) –arc	(1404;110) –arc	1394,4,1284] –code
(1404;110)-arc	(1417;111) –arc	1407,4,1306] –code
(1417;111) –arc	(1428;112) –arc	1428,4,1316] –code
(1428;112) –arc	(1442;113) –arc	1442,4,1329] –code
(1442;113) –arc	(1455;114) –arc	1455,4,1341] –code
(1455;114) –arc	(1469;115) =arc	1469,4,1354] –code
(1469;115) -arc	(1484;116) =arc	[1484,4,1368] -code
(1484;116) =arc	(1499;117) –arc	[1499,4,1382] -code
(1499;117) –arc	(1514;118) –arc	[1514,4,1396] –code
(1514;118) –arc	(1531;119) –arc	1521,4,1412] –code
(1531;119) –arc	(1546;120) –arc	[1546,4,1426] -code
(1546;120) –arc	(1562;121) –arc	[1552,4,1441] –code
(1562;121) –arc	(1579;122) –arc	[1579,4,1457] –code
(1579;122) –arc	(1594;123) –arc	[1594,4,1471] –code
(1594;123) –arc	(1607;124) –arc	1597,4,1483] –code
(1607;124) –arc	(1622;125) –arc	1622,4,1497] –code
(1622;125) –arc	(1637;126) –arc	1637,4,1511] –code
(1637;126)arc	(1654;127)arc	1654,4,1527] code

A complete (k ; n) – arcs	**a complete (k,n+1) - arcs**	**[k, n ,d] – codes**
(1654;127) –arc	(1671;128) –arc	1671,4,1543] –code
(1671;128) –arc	(1687;129) –arc	1687,4,1558] –code
(1687;129) –arc	(1701;130) –arc	1691,4,1571] –code
(1701;130) –arc	(1716;131) –arc	1716,4,1585] -code
(1716;131) –arc	(1731;132) –arc	1731,4,1599] –code
(1731;132) –arc	(1746;133) –arc	[1746,4,1613] –code
(1746;133) –arc	(1761;134) –arc	[1761,4,1627] –code
(1761;134) –arc	(1777;135) –arc	[1777,4,1642] –code
(1777;135) –arc	(1791;136) –arc	[1791,4,1655] –code
(1791;136) –arc	(1805,137) –arc	[1805,4,1668] –code
(1805,137) –arc	(1821;138) –arc	1821,4,1683] –code
(1821;138) –arc	(1836;139) –arc	[1836,4,1697] –code
(1836;139) –arc	(1851;140) –arc	[1841,4,1711] –code
(1851;140) –arc	(1868;141) –arc	[1868,4,1727] –code
(1868;141) –arc	(1884,142) –arc	[1884,4,1742] –code
(1884,142) –arc	(1902;143) –arc	[1902,4,1859] -code
(1902;143) –arc	(1919;144) –arc	[1919,4,1775] –code
(1919;144) –arc	(1936;145) –arc	1936,4,1791] –code
(1936;145) –arc	(1953,146) - arc	[1953,4,1807] –code
(1953,146) - arc	(1970;147) –arc	[1970,4,1823] code
(1970;147)arc	(1985;148) –arc	[1985,4,1837] -code
(1985;148) –arc	(1999;149) –arc	[1989,4,1850] –code
(1999;149) –arc	(2013;150) –arc	[2013,4,1863] –code
(2013;150) –arc	(2028;151) –arc	[2028,4,1877] –code
(2028;151) –arc	(2043;152) –arc	[2043,4,1891] –code
(2043;152) –arc	(2056;153) –arc	[2046,4,1903] -code
(2056;153) –arc	(2069;154) –arc	[2059,4,1915] –code
(2069;154) –arc	(2084;155) –arc	[2074,4,1929] –code
(2084;155) –arc	(2099;156) –arc	[2099,4,1943] –code
(2099;156) –arc	(2115;157) –arc	[2115,4,1958] -code
(2115;157) –arc	(2130;158) –arc	2130,4,1972] –code
(2130;158) –arc	(2146;159) –arc	2146,4,1987] –code
(2146;159) –arc	(2160;160) –arc	2160,4,2000] –code
(2160;160) –arc	(2175;161) –arc	2175,4,2014] –code
(2175;161) –arc	(2193;162) –arc	182,4,2031] –code
(2193;162) –arc	(2210;163) –arc	210,4,2o47] –code
(2210;163) –arc	(2226;164) –arc	221,4,2062] –code
(2226;164) –arc	(2244;165) –arc	244,4,2079] -code
(2244;165) –arc	(2261;166) –arc	261,4,2095] –code
(2261;166) –arc	(2278;167) –arc	287,4,2111] -code
(2278;167) –arc	(2295;168) –arc	295,4,2127] –code
(2295;168) –arc	(2313;169) –arc	[2313,4,2144] –code
(2313;169) –arc	(2331;170) –arc	[2331,4,2271] –code
(2331;170) –arc	(2349;171) –arc	[2349,4,2178] –code
(2349;171) –arc	(2367;172) –arc	[2367,4,2195] –code

A complete (k ; n) – arcs	**a complete (k,n+1) - arcs**	**[k, n ,d] – codes**
(2367;172) –arc	(2384,173) –arc	[2384,4,2211] –code
(2384,173) –arc	(2401;174) –arc	[2401,4,2327] –code
(2401;174) –arc	(2418;175) –arc	[2418,4,2243] –code
(2418;175) –arc	(2435;176) –arc	[2435,4,2259] –code
(2435;176) –arc	(2451;177) –arc	[2451,4,2374] -code
(2451;177) –arc	(2467;178) –arc	[2467,2289] –code
(2467;178) –arc	(2483;179) - arc	[2483,4,2304] -code
(2483;179) –arc	(2500;180) –arc	[2500,4,2320] –code
(2500;180) –arc	(2517;181) –arc	[2517,4,2336] –code
(2517;181) –arc	(2533;182) –arc	[2533,4,2351] -code
(2533;182) –arc	(2549;183) –arc	[2549,4,2366] –code
(2549;183) –arc	(2565;184) –arc	[2565,4,2381] -code
(2565;184) –arc	(2579;185) –arc	[2579,4,2394] -code
(2579;185) –arc	(2594;186) –arc	[2594,4,2418] -code
(2594;186) –arc	(2609;187) –arc	[2609,4,2422] -code
(2609;187) –arc	(2624;188) –arc	[2624,4,2436] -code
(2624;188) –arc	(2641,189) –arc	[2641,4,2452] -code
(2641,189) –arc	(2657;190) –arc	[2657,4,2467] -code
(2657;190) –arc	(2675;191) –arc	[2675,4,2484] -code
(2675;191) –arc	(2694;192) –arc	[2694,4,2502] -code
(2694;192) –arc	(2711;193) –arc	[2711,4,2518] -code
(2711;193) –arc	(2726;194) –arc	[2726,4,2532] -code
(2726;194) –arc	(2742;195) –arc	2742,4,2547] -code
(2742;195) –arc	(2758;196) –arc	2758,4,2562] -code
(2758;196) –arc	(2773;197) –arc	[2773,4,2576] -code
(2773;197) –arc	(2788;198) –arc	[2788,4,2590] -code
(2788;198) –arc	(2803;199) –arc	[2803,4,2604] -code
(2803;199) –arc	(2818;200) –arc	[2818,4,2618] -code
(2818;200) –arc	(2835;201) –arc	[3131,2634] -code
(2835;201) –arc	(2854;202) –arc	2854,4,2652] –code
(2854;202) –arc	(2872;203) –arc	[2872,4,2669] –code
(2872;203) –arc	(2892;204) –arc	[2892,4,2688] -code
(2892;204) –arc	(2911;205) –arc	[2911,4,2706] –code
(2911;205) –arc	(2931;206) –arc	[2931,4,2725] code
(2931;206) –arc	(2950;207) –arc	[2950,4,2743] –code
(2950;207) –arc	(2969;208) –arc	[2969,4,1761] –code
(2969;208) –arc	(2988;209) –arc	2988,4,2779] –code
(2988;209) –arc	(3007;210) –arc	[3007,4,2797] -code
(3007;210) –arc	(3025;211) –arc	[3025,4,2814] –code
(3025;211) –arc	(3041;212) –arc	[3041,4,2829] –code
(3041;212) –arc	(3057;213) –arc	[3057,4,2844] -code
(3057;213) –arc	(3075;214) –arc	[3075,4,2861] - code
(3075;214) –arc	(3094;215) –arc	[3094,4,2879] –code
(3094;215) –arc	(3114;216) –arc	[3114,4,2898] –code
(3114;216) –arc	(3133;217) –arc	[3133,4,2916] –code

A complete (k ; n) – arcs	**a complete (k,n+1) - arcs**	**[k, n ,d] – codes**
(3133;217) –arc	(3151;218) –arc	[3151,4,2933] –code
(3151;218) –arc	(3170;219) –arc	[3170,4,2951] –code
(3170;219) –arc	(3191;220) –arc	[3191,4,2971] –code
(3191;220) –arc	(3209;221) –arc	[3209,4,2988] –code
(3209;221) –arc	(3227;222) –arc	[3227,4,3005] –code
(3227;222) –arc	(3246;223) –arc	[3246,4,3023] –code
(3246;223) –arc	(3264;224) –arc	[3264,4,3040] -code
(3264;224) –arc	(3282;225) –arc	[3282,4,3057] –code
(3282;225) –arc	(3301;226) –arc	[3301,4,3075] –code
(3301;226) –arc	(3321;227) –arc	[3321,4,3094] -code
(3321;227) –arc	(3338;228) –arc	[3338,4,3110] –code
(3338;228) –arc	(3355;229) –arc	[3355,4,3126] –code
(3355;229) –arc	(3374;230) –arc	[3374,4,3144] –code
(3374;230) –arc	(3392;231) –arc	[3392,4,3161] –code
(3392;231) –arc	(3410;232) –arc	[3410,4,3178] –code
(3410;232) –arc	(3429;233) –arc	[3429,4,3196] –code
(3429;233)-arc	(3447;234) –arc	[3447,4,3213] –code
(3447;234) –arc	(3468;235) –arc	[3468,4,3233] –code
(3468;235) –arc	(3489;236) –arc	[3489,4,3253] –code
(3489;236) –arc	(3508;237) –arc	[3508,4,3271] –code
(3508;237) –arc	(3527;238) –arc	[3527,4,3289] –code
(3527;238) –arc	(3545;239) –arc	[3545,4,3306] –code
(3545;239)-arc	(3566;240) –arc	[3566,4,3326] –code
(3566;240) –arc	(3586;241) –arc	[3586,4,3345] –code
(3586;241) –arc	(3605;242) –arc	[3605,4,3363] –code
(3605;242)-arc	(3626;243) –arc	[3626,4,3383] –code
(3626;243) –arc	(3647;244) –arc	[3647,4,3403] –code
(3647;244) –arc	(3669;245) –arc	[3669,4,3424] -code
(3669;245) –arc	(3691;246) –arc	[3691,4,3445] -code
(3691;246) –arc	(3729;247) –arc	[3710,4,3463] -code
(3729;247) –arc	(3729;248) –arc	[3729,4,3681] -code
(3729;248) –arc	(3751;249) –arc	[3751,4,3502] –code
(3751;249) –arc	(3776;250) –arc	[3776,4,3526] –code
(3776;250)-arc	(3796;251) –arc	[3796,4,3545] -code
(3796;251) –arc	(3817;252) –arc	[3817,4,3565] -code
(3817;252) –arc	(3838;253) –arc	[3838,4,3585] –code
(3838;253) –arc	(3859;254) –arc	[3859,4,3605] –code
(3859;254) –arc	(3882;255) –arc	[3882,4,3627] –code
(3882;255) –arc	(3905;256) –arc	[3905,4,3649] –code
(3905;256) –arc	(3929;257) –arc	[3929,4,3672] –code
(3929;257) –arc	(3953;258) –arc	[3953,4,3695] –code
(3953;258) –arc	(3973;259) –arc	[3973,4,3714]
(3973;259) –arc	(3996;260) –arc	[3996,4,3736] –code
(3996;260) –arc	(4018;261) –arc	[4018,4,3757] -code
(4018;261) –arc	(4043;262) –arc	[4043,4,3781] -code

A complete (k ; n) – arcs	**a complete (k,n+1) - arcs**	**[k, n ,d] – codes**
(4043;262) –arc	(4069,263) –arc	[4069,4,3806] –code
(4069,263) –arc	(4095;264) –arc	[4095,4,3831] –code
(4095;264) –arc	(4117;265) –arc	[4117,4,3852] –code
(4117;265) –arc	(4140;266) –arc	[4140,4,3874] –code
(4140;266) –arc	(4165;267) –arc	[4165,4,3898] –code
(4165;267) –arc	(4190;268) –arc	[4190,4,3922] –code
(4190;268) –arc	(4213;269) –arc	[4213,4,3944] –code
(4213;269) –arc	(4237;270) –arc	[4237,4,3967] -code
(4237;270) –arc	(4262;271) –arc	[4262,4,3991] –code
(4262;271) –arc	(4285;272) –arc	[4285,4,4013] –code
(4285;272) –arc	(4307;273) –arc	4307,4,4034] –code
(4307;273) –arc	(4328;274) –arc	4328,4,4054] –code
(4328;274) –arc	(4351;275) –arc	4351,4,4076] –code
(4351;275) –arc	(4376;276) –arc	[4376,4,4100] –code
(4376;276) –arc	(4401;277) –arc	[4401,4,4124] –code
(4401;277) –arc	(4423;278) –arc	[4423,4,4145] –code
(4423;278)-arc	(4443;279) –arc	[4443,4,4164]code
(4443;279) –arc	(4463;280) –arc	[4463,4,4183] –code
(4463;280) –arc	(4486;281) –arc	[4486,4,4205] –code
(4486;281) –arc	(4511;282) –arc	[4511,4,4229] –code
(4511;282) –arc	(4537;283) –arc	[4537,4,4254] –code
(4537;283) –arc	(4561;284) –arc	[4561,4,4277] –code
(4561;284) –arc	(4584;285) –arc	[4584,4,4299] –code
(4584;285) –arc	(4608;286) –arc	[4608,4,4322] –code
(4608;286) –arc	(4632;287) –arc	[4632,4,4345] –code
(4632;287) –arc	(4659;288) –arc	[4659,4,4371] –code
(4659;288) –arc	(4683;289) –arc	[4683,4,4394] –code
(4683;289) –arc	(4703;290) –arc	[4703,4,4413] –code
(4703;290) –arc	(4723;291) –arc	[4723,4,4432] –code
(4723;291) –arc	(4749;292) –arc	[4749,4,4457] –code
(4749;292) –arc	(4777;293) –arc	[4777,4,4484] –code
(4777;293) –arc	(4805;294) –arc	[4805,4,4511] -code
(4805;294) –arc	(4836;295) –arc	[4836,4,4541] -code
(4836;295) –arc	(4863;296) –arc	[4863,4,4567] –code
(4863;296) –arc	(4893;297) –arc	[4893,4,4596] -code
(4893;297) –arc	(4920;298) –arc	[4920,4,4622] –code
(4920;298) –arc	(4949;299) –arc	[4949,4,4650] –code
(4949;299) –arc	(4978;300) –arc	[4978,4,4678] -code
(4978;300) –arc	(5008;301) –arc	[5008,4,4707] -code
(5008;301) –arc	(5035;302) –arc	[5035,4,4733] -code
(5035;302) –arc	(5062;303) –arc	[5062,4,4759] –code
(5062;303) –arc	(5088;304) –arc	[5088,4,4784] -code
(5088;304) –arc	(5120;305) –arc	[5120,4,4815] -code
(5120;305) –arc	(5158;306) –arc	[5158,4,4852] -code

The maximum complete arc denoted by $€_{307}$ a complete (k;307) - arc $€_{307}$ is constructed from the complete (5158;306) - arc $€_{306}$, when add sixty-two point to the complete (5158;6) - arc$€_{306}$ we get a complete (5220; 307) - arc $€_{307}$, where $€_{307}$ = $€_{306}$∪{ 307,596,885,1174,1463,1752,20412330,2619,2908,3197,3456,3752,4060, 4268,46424720,4778,4879,4946,4952, 4975,4980,4982,49935006,5011,5024, 5042,5045,5047,5048,5052,50685072,5073,5083,5085,5086,5087,5102,5104, 51055106,5119,5136,5137,5138,5152, 5153,5164,51695186,5199,5201,5202, 5203,5209,5210,5218,52195220},anew code arising (5220;307) - arc $€_{307}$ is[5220,4,4913] -code.

4.MATLABE$_{19B}$ program to find point and plane in PG(3,17)

.4.1 MATLAB$_{19B}$(1) to find a complete(k;n) -arc and arising new codes.

```
clc;
clear;
q=17;
Q=2;
%profile on
tic
[Point,Plane]=PointPlane(q);
toc
I=q+1;              % length of line
K=q^2+I;            % length of plane
N=q^3+K;            % length of projective space
M=N*I;
 P=Plane;
 [m] = size(P,1);
 % pre-allocate memory to the cell output matrix (which is symmetric)
 cellMtx = cell(m,m);
 for u=1:m
   for v=u+1:m
      % determine the intersection between the two rows
      cellMtx{u,v} = intersect(P(u,1:end),P(v,1:end));
      cellMtx{v,u} = cellMtx{u,v};
   end
 end
%% convert cells to MAtrix  & remove the duplicate values
 F=cell2mat(cellMtx);
 for i=1:N
    E(:,i*I-(I-1):i*I)=unique(F(:,i*I-(I-1):i*I), 'rows');
 end
E=E';
new_R=E;
writematrix(E,'E.txt','Delimiter','tab');
writematrix(Point,'Point.txt','Delimiter','tab');
writematrix(Plane,'Plane.txt','Delimiter','tab');
   if Q>2
      filename = ['B', num2str(Q-1),'.txt'];
      B=readmatrix(filename);
      B_Mat=readmatrix(filename);
   else
     J=[0 0 0 1; 0 0 1 0; 0 1 0 0; 1 0 0 0; 1 1 1 1];
     [tf, ~]=ismember(Point,J,'rows');
     B=find(tf);
      B_Mat=B;
   end
   OK=1;
   while (sum(new_R(:)))
     for i=1:N
        R=E(i*I-(I-1):i*I,:);
        Y=ismember(R,B);
        S = sum(Y,1);
        indx=find(S==Q);
        H=ismember(new_R,R(:,indx));
        new_R(H(:))=0;
     end
     if OK
        V=sort(new_R(:));
        V=unique(V);
        V(V==0)=[];
        filename = ['First_it', num2str(Q),'.txt'];
        writematrix(V,filename,'Delimiter','tab');
     end
     if ~any(H(:)) && Q>2 && (sum(new_R(:)))
        B1=~ismember(E,B);
        uA1=unique(nonzeros(E(B1)));
        uA1=sort(uA1);
        B(end+1)=uA1(1);
     End
```

6. conclusions

From the results that we obtained for construct
A complete (k , n) - arcs we found that a(5220,307) - arcs is a maximum complete arcs in PG(3,17) - arc.

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رموز جديدة تنشأ من الأقواس الكاملة (n,k) فيPG(3,17)

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الملخص

الهدف الرئيسي من هذا العمل هو العثور على رموز جديدة نتيجة إنشاء قوس كامل (k ,n) - قوس في PG (3،17) ، حيث n =7,6,5,4,3 نأخذ اتحاد البعض (k , n) - الأقواس ، أيضًا عندما 307 ,. . . n = 8,9, نستخدم برنامج (1) matlab19B للعثور على جميع الإنشاءات الاقواس الكاملة (n + 1 , k) - أقواس كاملة (k , n) - نبدأ بنقاط المؤشرا لصفري والنقطة الواحدية والتي نسميها النقاط الأساسية للجدول (النقاط والمستويات) ، ثم نضيف نقاط من النقاط المتبقية من تثبيت نقاط القوس الأول حتى نحصل على تقاطعات يتم من خلالها حذف جميع نقاط المستوى ، ثم نكرر هذه الطريقة حتى نحصل على أقصى حد كامل (5220 ؛ 307) - القوس.ثم نجد $[k ، n ، d]_q$ كود q لك قوس كاملة (k , n) - أقواس.

الكلمات المفتاحية : الهندسة الجبرية ،البناء للاقواس التامة ، ترمي