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Topological folding of multiple chaotic graphs with density variation

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Abstract: Chaotic graph is a graph which carries physical characters with density variation; the density of chaotic graphs can be fixed and unique or different, according to this the representation of the chaotic graphs by matrices is different to normal chaotic graphs and this research is a following discussion to previous research done, which is "Folding simple chaotic graphs with density variation, Journal of Humanities and Applied Science (JHAS)".[1] Firstly, we will discuss the idea of topological folding of multiple chaotic graphs with density variation and we start by introducing the definition of multiple graphs, and we will define the incidence matrix representing the topological folding of this type of multiple chaotic graphs, also the limit of this folding will be deduced. In each case we will discuss the decrease or increase the degree of density.

Keywords: Geometric graph, chaotic graphs, density, incidence matrix, topological folding.

I.   Introduction

There are many physical systems whose performance depends not only on the characteristics of the components but also on the relative locations of the elements. An obvious example is an electrical network. If we change a resistor to a capacitor, generally some of the properties (such as an input impedance of the network) also change. This indicates that the performance of a system depends on the characteristics of the components. If, on the other hand, we change the location of one resistor, the input impedance again may change, which shows that the topology of the system is influencing the system's performance. There are systems constructed of only one kind of component so that the system's performance depends only on its topology. An example of such a system is a single-contact switching circuit. Similar situations can be seen in nonphysical systems such as structures of administration. Hence it is important to represent a system so that its topology can be visualized clearly.

One simple way of displaying a structure of a system is to draw a diagram consisting of points called "vertices" and line segments called "edges" which connect these vertices so that such vertices and edges indicate components and relationships between these components. Such a diagram is called a "Linear graph" whose name depends on the kind of physical system we deal with. This means that it may be called a network, a net, a circuit, a graph, a diagram, a structure, and so on.

Instead of indicating the physical structure of a system, we frequently indicate its mathematical model or its abstract model by a "Linear graph". Under such a circumstance, a linear graph is referred to as a flow graph, a signal flow graph, a flow chart, a state diagram, an organization diagram, and so forth.

The generalization of this graph is the "fuzzy graph" and the most generalization of them is the "chaotic graph", which applied in many uncertain circuits, resonance, perturbation theory and many other applications. More advanced applications using the more complicated graphs are the chaotic graphs [1,2,3].

Generally, **a chaotic graph** is a geometric graph that carries many other graphs or physical characters, these geometric graphs might have similar properties or different [2].

Chaotic graph with density variation: is a geometric graph that carries many other graphs or physical characteristics, these geometric graphs might have similar properties or different, that density have two cases equal densities or different densities.

Simple graph:
A "simple " graph is a graph with no loops or multiple edges [3,4].

Multiple edges:
Two or more edges joining the same pair of vertices are called " multiple edges" [4].
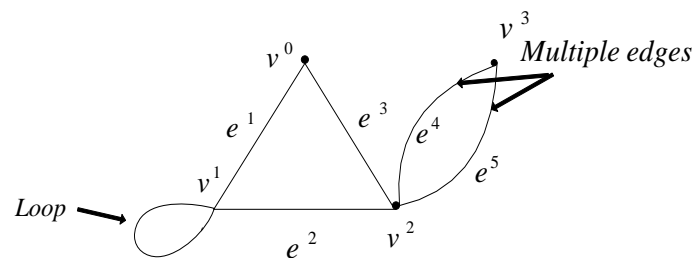
Multiple graphs:
A multiple graph has multiple edges. Sometimes the multiple graphs are called a general graph or simply a graph[5].

The incidence matrix: Let G be a graph without loops, with n-vertices labeled $1,2,3,...,n$ and m- edges labeled $1,2,3,...,m$. The" incidence matrix" $I(G)$ is the $n \times m$ matrix in which the entry in row i and column j is 1 if vertex i is incident with edge j and 0 otherwise [4, 5, 6].

Null graph: Is a graph consists of a set of vertices and no edges [7,8,9].

Loop: A loop is an edge which starts and ends on the same vertex [6, 7, 8].

Example: Consider the multiple graph G in Figure (1):

Figure (1). Multiple graph

The incidence matrix $I(G)$ is:
$$I(G) = \begin{bmatrix} 1 & 0 & 1 & 0 & 0 \\ 1^1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \end{bmatrix}$$

Noting that the symbol (1^1) in the second row and first column means that we have one loop at the vertex v^1 with the edge e^1. Also, if we have two loops at the same above vertex, we symbolize it by 1^{11}. Moreover, if we have an infinite number of loops at any vertex, say v^i, we use the symbol $1^{1111...}$ to represent them [1].

Density (d): Is a physical property of matter, as each element and compound have a unique density associated with it [1].

Folding:
The Field of folding began with S. A. Robertson's work, in 1977 [10], on isometric folding of Riemannian manifold M into another N, which send any piecewise geodesic path in M to a piecewise geodesic path with the same length in N. More studies on the folding of manifolds are studied by M. El-Ghoul.

This paper the physical character is presented by density, the density might be constant everywhere or vary from place to another place, for example the color of a plant leaves is a

perfect green, or magnetic field waves have the same velocity. We will denote the degree of each area on the chaotic graph by d_{pq}, where p denotes levels of chaotic graph, while q denotes different areas on each level of chaotic graph.

1- Folding multiple chaotic graphs with density variation

There are two fundamental types of folding of any graph, especially chaotic graphs:

1- One contracts the distances (the edges) between the vertices in the multiple graphs under consideration. (Topological Folding).

2- The other type of folding has multiple choices, it may be folding a vertex to a vertex, folding an edge to another one, folding of a loop to another loop, and folding of an edge to loop.

1.1. Topological folding

Definition of topological Folding:

Generally topological folding can be defined as:

Let $F : G \to \overline{G}$ be a map between any two graphs G and $\overline{G}$ (not necessarily to be simple) such that if $(u,v) \in G, (f(u), f(v)) \in \overline{G}$; then f is called a "topological folding" of G and $\overline{G}$ provided that $d(f(u), f(v)) \le d(u,v)$.

So we can generalise this to chaotic graph as:

If $F : G \to \overline{G}$ be a map between any two chaotic graphs G_h and $\overline{G}_h$ (not necessarily to be simple) such that if $(v_{ih}^i, v_{ih}^{i+1}) \in G_h, i, j = 0,1,2,.., (f(v_{ih}^i), f(v_{ih}^{i+1})) \in \overline{G}_h$; then f is called a "topological folding" of G_h and $\overline{G}_h$ provided that $d(f(v_{ih}^i), f(v_{ih}^{i+1})) \le d(v_{ih}^i, v_{ih}^{i+1})$. [11]

Her we will divide the topological folding into subtypes as follows:

(a)-The folding (contraction) is restricted on the geometric graph only, but not on the chaotic edges or chaotic loops.

Consider a chaotic multiple chaotic graph $G_h^{(m)d}$, where h shows that the graph is chaotic graph and m shows that a graph has multiple edges; and it has a geometric loop α_{0h} at v_{jh}^1 ,overlapped on an infinite number of different chaotic loops $\alpha_{1h}, \alpha_{2h}, \alpha_{3h}, ... \alpha_{\infty h}$. The successive folding's of this chaotic graph with density are $G_h^{(m1)d}, G_h^{(m2)d^\bullet}, ... G_h^{(m\infty)d^{\bullet\bullet\infty}}$.(See figure (1.1.1))
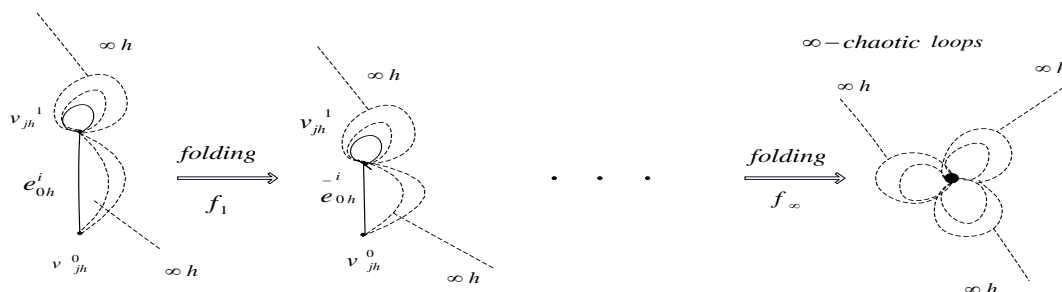
$$G_h^{(m)d} (multiple) \implies G_h^{(m1)^{\bullet}d} (multiple) \implies . . . \implies G_h^{(m\infty)^{\bullet\bullet\bullet}d} (semi-multiple)$$

$$(d < \overset{\bullet}{d} < \overset{\bullet\bullet}{d} .... < \overset{\bullet\bullet\bullet\bullet\infty}{d})$$

Figure (1.1)

The end limit of successive folding sequence is a geometric vertex overlapped on by infinitely different chaotic loops with density without any geometric loops resulting a semi multiple chaotic graphs and each chaotic edge keeps its own density as before folding process, while the geometric edge and geometric loop changed by folding into one vertex with higher density whatever if the density is constant or varies on the geometric edge and geometric loop, in all cases the density will increase.

The chaotic incidence matrix with density representing the original chaotic multiple graph $G_h^{(m)d}$ is as follows I_1:

$$I_1 = \begin{bmatrix} 1_{(012...\infty)d_{pq}h} & 0 & . & . & . & . & . \\ 1_{(012...\infty)d_{pq}h} & 1_{(012...\infty)d_{pq}h} & 0 & . & . & . & . \\ 0 & 1_{(012...\infty)d_{pq}h} & 1_{(012...\infty)d_{pq}h} & 0 & . & . & . \\ 0 & 0 & 1_{(012...\infty)d_{pq}h} & 1_{(012...\infty)d_{pq}h} & 0 & . & . \\ . & 0 & 0 & 1_{(012...\infty)d_{pq}h}^{1_{(012...\infty)d_{pq}h}} & 1_{(012...\infty)d_{pq}h} & 0 & . \\ . & . & . & 0 & 1_{(012...\infty)d_{pq}h} & 1_{(012...\infty)d_{pq}h} & . \\ . & . & . & . & . & . & . \end{bmatrix}$$

Also, the incidence matrix representing folding chaotic multiple graphs with density variation $G_h^{(m1)d}$ (density has increased) of the given chaotic multiple graphs with density G_h^{md} is I_2 where,

$$I_2 = \begin{bmatrix} 1_{(012...\infty)d^{\bullet}_{pq}h} & 0 & . & . & . & . & . \\ 1_{(012...\infty)d^{\bullet}_{pq}h} & 1_{(012...\infty)d^{\bullet}_{pq}h} & 0 & . & . & . & . \\ 0 & 1_{(012...\infty)d^{\bullet}_{pq}h} & 1_{(012...\infty)d^{\bullet}_{pq}h} & 0 & . & . & . \\ 0 & 0 & 1_{(012...\infty)d^{\bullet}_{pq}h} & 1_{(012...\infty)d^{\bullet}_{pq}h} & 0 & . & . \\ . & 0 & 0 & 1_{(012...\infty)d^{\bullet}_{pq}h}^{1_{(012...\infty)d^{\bullet}_{pq}h}} & 1_{(012...\infty)d^{\bullet}_{pq}h} & 0 & . \\ . & . & . & 0 & 1_{(012...\infty)d^{\bullet}_{pq}h} & 1_{(012...\infty)d^{\bullet}_{pq}h} & . \\ . & . & . & . & . & . & . \end{bmatrix}$$

And then the incidence matrix representing the chaotic multiple graph $G_h^{(m\infty)d}$ induced from the limit of the successive folding sequence of the given chaotic multiple graphs with density $G_h^{(m)d}$ is I_∞ where ,

$$I_\infty = \begin{bmatrix} . & . & . & . & . & . & . \\ 0 & . & . & . & . & . & . \\ 0 & 0 & . & . & . & . & . \\ . & 0 & . & 0 & 0 & . & . \\ . & . & 0 & 0^{1_{(12...\infty)d^{\bullet\bullet\bullet\infty}_{pq}h}}1_{(12...\infty)d^{\bullet\bullet\bullet\infty}_{pqh....}} & 0 & 0 & . \\ . & . & 0 & 0 & . & 0 & 0 \\ . & . & . & . & . & . & . \end{bmatrix}$$

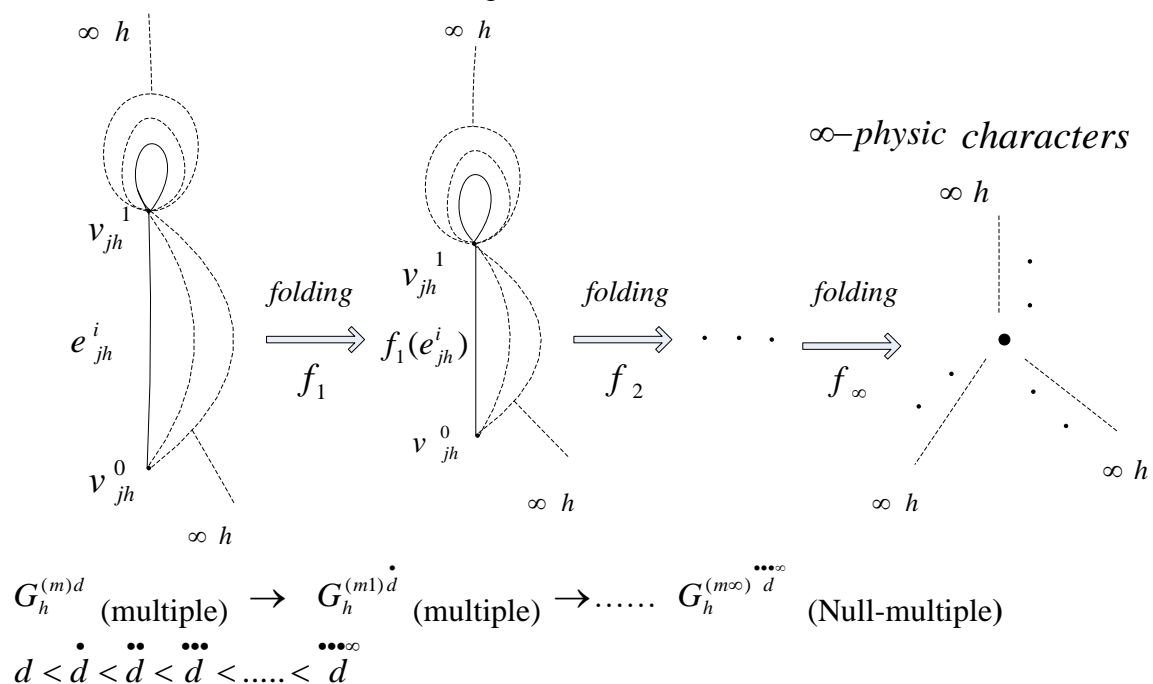From the all above, we can formulate the following theorem;

Theorem (1.1.1):
The chaotic incidence matrices representing each of the given and the induced chaotic multiple graphs are similar to each other but differ from the incidence matrix representing the chaotic (semi- multiple) graph induced from the limit of successive folding and the density increases each time we fold a chaotic edge.

(b)- The second type of topological folding (the contraction) is to fold both the geometric and the chaotic edges, in this case the end limit of successive folding is one vertex has greater density with no chaotic edges (i.e. null graph), so the density has increased more than in the previous case, so if we want to increase rate of density, it is preferred to choose this kind of folding rather than the previous folding, because the rate of density increases each time we fold a chaotic edge, not only when we fold the geometric edge (i.e. more density, less distance for the graph).

Consider a multiple chaotic graph $G_h^{(m)d}$ with a geometric loop α_{0h} at v_{jh}^1 ,overlapped on an infinite number of different chaotic loops $\alpha_{1h}, \alpha_{2h}, \alpha_{3h}, ... \alpha_{\infty h}$. The successive folding of this chaotic multiple graph with density $G_h^{(m)d}$ are the chaotic multiple graphs with density $G_h^{(m1)d}, G_h^{(m2)d^\bullet}, ... G_h^{(m\infty)d^{\bullet\bullet\bullet\infty}}$. (See figure (1.1.2))

$G_h^{(m)d}$ (multiple) $\rightarrow$ $G_h^{(m1)\dot{d}}$ (multiple) $\rightarrow$ ...... $G_h^{(m\infty)\overset{\bullet\bullet\bullet\infty}{d}}$ (Null-multiple)

$d < \dot{d} < \ddot{d} < \overset{\bullet\bullet\bullet}{d} < ..... < \overset{\bullet\bullet\bullet\infty}{d}$

Figure (1.1.2)

In similar way, the chaotic incidence matrix representing the given chaotic multiple graphs with density $G_h^{(m)d}$ is I_1 where,

$$I_1 = \begin{bmatrix} 1_{(012...\infty)d_{pq}h} & 0 & . & . & . & . & . \\ 1_{(012...\infty)d_{pq}h} & 1_{(012...\infty)d_{pq}h} & 0 & . & . & . & . \\ 0 & 1_{(012...\infty)d_{pq}h} & 1_{(012...\infty)d_{pq}h} & 0 & . & . & . \\ 0 & 0 & 1_{(012...\infty)d_{pq}h} & 1_{(012...\infty)d_{pq}h} & 0 & . & . \\ . & 0 & 0 & 1^{1_{(012...\infty)d_{pq}h}}_{(012...\infty)d_{pq}h} & 1_{(012...\infty)d_{pq}h} & 0 & . \\ . & . & . & 0 & 1_{(012...\infty)d_{pq}h} & 1_{(012...\infty)d_{pq}h} & . \\ . & . & . & . & . & . & . \end{bmatrix}$$

The incidence matrix representing the folding chaotic multiple graph $G_h^{(m1)d}$ (density has increased) of the given chaotic multiple graphs with density G_h^{md} is I_2 where,

$$I_2 = \begin{bmatrix} 1_{(012...\infty)d^\bullet_{pq}h} & 0 & . & . & . & . & . \\ 1_{(012...\infty)d^\bullet_{pq}h} & 1_{(012...\infty)d^\bullet_{pq}h} & 0 & . & . & . & . \\ 0 & 1_{(012...\infty)d^\bullet_{pq}h} & 1_{(012...\infty)d^\bullet_{pq}h} & 0 & . & . & . \\ 0 & 0 & 1_{(012...\infty)d^\bullet_{pq}h} & 1_{(012...\infty)d^\bullet_{pq}h} & 0 & . & . \\ . & 0 & 0 & 1^{1_{(012...\infty)d^\bullet_{pq}h}}_{(012...\infty)d^\bullet_{pq}h} & 1_{(012...\infty)d^\bullet_{pq}h} & 0 & . \\ . & . & . & 0 & 1_{(012...\infty)d^\bullet_{pq}h} & 1_{(012...\infty)d^\bullet_{pq}h} & . \\ . & . & . & . & . & . & . \end{bmatrix}$$

And then the incidence matrix representing the final chaotic graph $G_h^{(m\infty)d}$ induced from the end limit of successive folding sequence of the given chaotic multiple graph $G_h^{(m)d}$ is I_∞ where,

$$I_\infty = \begin{bmatrix} . & . & . & . & . & . \\ 0 & . & . & . & . & . \\ 0 & 0 & . & . & . & . \\ . & 0 & . & 0 & 0 & . \\ . & . & 0 & 0^{0_{(12...\infty)d^{\bullet\bullet\bullet\infty}pqh}}0^{0_{(12...\infty)d^{\bullet\bullet\bullet\infty}pqh....}} & 0 & 0 \\ . & . & 0 & 0 & . & 0 & 0 \\ . & . & . & . & . & . \end{bmatrix}$$

Since the final graph resulted from folding process is the null graph, according to this the matrix is incidence matrix representing null graph is the zero matrix.
The end limit of topological folding to the geometric graph and chaotic edges is the null graph with great density matrix.

$$f_1 : G_h^{(m)d} \longrightarrow G_h^{(m1)d} , f_2 : G_h^{(m1)d} \longrightarrow G_h^{(m2)d} , f_3 : G_h^{(m2)d} \longrightarrow G_h^{(m3)d} ,....., \lim_{n \to \infty} f_n (G_h)^{(m(n-1))d} = G_h^{(mn)d} = G^D$$

D means greates density

Each folding reduces the length of the graph and increase its density, and each time we repeat the process, the graph is reduced more and the density increases more than before, until we reach the end limit of folding the geometric edge and all chaotic edges and both vertices folded on each other, so we end up with one vertex has greater density than before and this exactly the null graph, see figure (1.1.3).

$\infty\, h$

$\infty - physical$
$characters$

$Final\ \ folding$

$\infty\ h$ $\infty\ h$

G_h^{∞} N_1
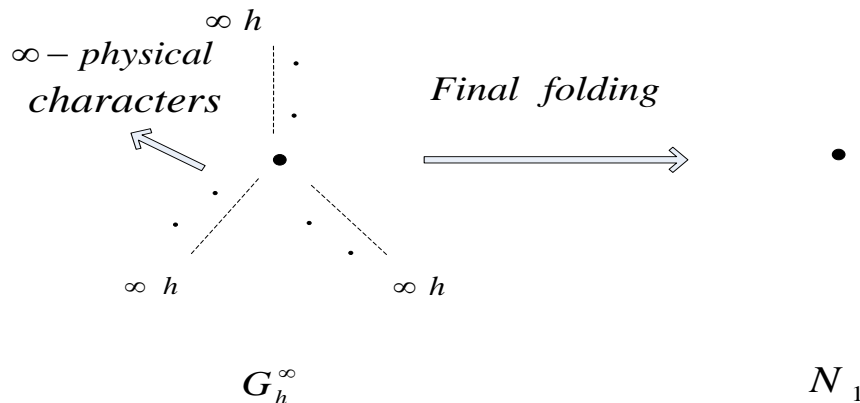
Figure (1.1.3)

And the incidence matrix will take the form (i.e., zero matrix)

$$I_{final} = \begin{bmatrix} . & . & . & . & . & . \\ 0 & . & . & . & . & . \\ 0 & 0 & 0 & . & . & . \\ . & 0 & 0 & 0 & 0 & . \\ . & . & . & 0 & 0 & . \\ . & . & . & . & . & . \end{bmatrix}$$

Theorem (1.1.3):

The chaotic incidence matrices representing each of the given induced folding of chaotic multiple graphs of type (b) are similar to each other, but differs from what representing the null chaotic graph induced from the limit of successive folding, and this is exactly the incidence matrix representing the null chaotic graph.

Corollary (1.1.4): The end limit of successive folding (i.e., the final folding) of any chaotic multiple graphs under folding of type **(b)** is the geometric null graph and the incidence matrix representing this induced graph is the zero matrix. See figure (1.1.3)

Conclusion

This paper discussed the idea of folding of chaotic multiple graphs with density variation; the incidence and adjacency matrix were obtained; two types of topological folding were studied. Generally, the topological folding increases the density and reduces the length of the graph. The limit of successive folding a vertex into another vertex of a geometric graph only is a geometric vertex overlapped on by different chaotic loops and each loop has its own density characters, while the limit of successive folding of a vertex into another vertex of a geometric graph with folding chaotic edges too is a geometric vertex without any loops and it has greater

density than before and this is exactly the null chaotic graph; indeed the end limit folding of this type of folding induces a null graph (i.e. non-multiple graph) and it has the zero matrix.

As a future study, we can extend the idea of folding into chaotic folding of multiple chaotic graphs, which is a more complicated than the topological folding.

Applications:

- Folding a plant leaves, most of plant leaves have variation of green color, according to these chaotic graphs can present the variation of green color of the leaves according to the density character.

- Folding a balloon, the density of the balloon color increase, while the length of the balloon decrease.

- An effective example of chaotic graph with density variations is the nerve system human body such that the nerve system in the body carries many different signals a very such a different signal represents a 1-chaotic graph, where the signals are different and depends on the mission it carries.

- The perturbation of magnetic field waves and the resonance of the waves are the chaotic graphs, since every single wave of magnetic field has different wavelength and speeds, and the wave length varies on the periodic time.

REFERENCES:

[1]- Alogab, F. M. Folding Simple chaotic graphs with density variation. Journal of Humanities and Applied Science (JHAS). Issue No. (29) December 2016. Zliten. Libya.

[2]- El-Ghoul M.; El-Ahmady A; Homda T.: On chaotic graphsand applications in physics and biology. Chaos, Solions and Fractals,27, 159-173, UK, (2006).

[3]- El- Ahmady A. and Rafa H.: A calculation of geodiesics in chaotic .at space and its folding. Chaos, Solions and Fractals, 30,836-844, UK, (2006).

[4]- El- Ahmady A.: The deformation retracts of a manifold admitting a simple transitive group of motions and its topological folding. Bull. Cal. Math. Soc. , 96, 4, 279-284, (2004).

[5]- El-Ghoul M. ; El-Ahmady AE ; Homda T. On chaotic graphs and applications in physics and biology. Chaos, Solions and Fractals, 27, 159-173, UK, (2006).

[6]- Gross, J.L. and Tucker, T.W.: Topological graph theory. Jon Wiley & Sons, Inc, Canada1987.

[7]- Wilson, R.J. and Watkins, J.J.: Graphs, an introductory ap-proach, a .rst course in discrete mathematics. Jon Wiley & Sons Inc,Canada, 1990.

[8]- Gibbon A.: Algorithmic graph theory. Cambridge University Press, Cambridge, UK, 1985.

[9]- Wilson R. J.: Introduction to graph theory. Oliver and Boyed, Edinburgh 1972.

[10]-S. A. Robertson: "Isometric folding and topological folding of manifolds", proc. Roc. Edinburgh, 77, 257(1977).

[11]- El- Ghoul, M. Folding of fuzzy tours and fuzzy graphs, Fuzzy sets and systems, 80, 389-396, North-Holland, (1996).

الفهــــــــــرس

192-204	فاطمة أحمد قناو	عنوان البحث التغذية الراجعة في العملية التعليمية (مفهومها – أهميتها- أنواعها)	16
205-214	فوزي محمد رجب الحوات سكينه الهادي إبراهيم الحوات	التسول أسبابه وسبل علاجه	17
215-226	Turkiya A. Aljamal	Some properties of Synchronization and Fractional Equations	18
227-242	عبد الرحمن بشير الصابري إبراهيم عبدالرحمن الصغير أبوبكر أحمد الصغير	منهج المدابغي واستدراكاته في حاشيته على شرح الأشموني على الألفية في أبواب النواسخ	19
243-254	بنور ميلاد عمر العماري	أهمية دور الأخصائي الاجتماعي في المؤسسات التعليمية	20
255-267	فرج محمد صالح الدريع	ليبيا وأبرز النخب السياسية والثقافية 1862م -1951م (دراسة تاريخية في تطورها)	21
268-282	ميلود مصطفى عاشور	فن المعارضات في الشعر الليبي الحديث	22
283-296	فرج محمد جمعة عماري	ما خالف فيه الأخفش سيبويه في باب الكلام وأقسامه: دراسة تحليلية	23
297-304	Ramadan Ahmed Shalbag Ahmed Abd Elrahman Donam Abdelrahim Hamid Mugaddim	A Case Study on Students' Attitude Towards Speaking and Writing Skills Among Third& Fourth Year University Students at the Faculty of Education, Elmergib University	24
305-315	بلال مسعود عبد الغفار التويمي	الوضع الاقتصادي للأسرة دور منحة الزوجة والأبناء في تحسين الليبية دراسة تقييمية للتشريعات الصادرة بخصوصها من "2013م – 2014م"	25
316-331	فرج مفتاح العجيل	تنمية الأداء المهني لمعلمي علم النفس بالمرحلة الثانوية وأثره في تحصيل طلابهم (دراسة ميدانية لتنمية معلمي علم النفس أثناء تدريسهم لطلاب الصف الثاني للمرحلة الثانوية)	26
332-351	فتحية علي جعفر	بعض الصعوبات التي تواجه دمج المعاقين في المدارس العادية	27
352-357	Rabia O Eshkourfu Hanan Ahmed Elaswad Fatma Muftah Elmenshaz	Determination of Chemical and Physical Properties of Essential Oil Extracted from Mixture of Orange and Limon Peels Collected from Al-khoms–Libya	28
358-370	Elnori Elhaddad	A case study of excessive water production diagnosis at Gialo E-59 Oil field in Libya	29
371-383	عبد الجليل عبد الرازق الشلوي	(ثورة التقنيات الحديثة وتأثيرها على الفنان التشكيلي)	30
384-393	Abdul Hamid Alashhab	La poésie de la résistance en France Le cas de La Rose et Le Réséda de Louis Aragon et Liberté de Paul Éluard	31
394-406	إبراهيم رمضان هدية مصطفى بشير محمد رمضان	مختصر لطائف الطرائف في الاستعارات من شرح السمرقندية بشرح المُلَّوي (دراسة وتحقيق)	32
307-421	Ragb O. M. Saleh	Simulation and Analysis of Control Messages Effect on DSR Protocol in Mobile Ad-hoc Networks	33
422-432	أبو عائشة محمد محمود فرج الجعراني عثمان	طرق التدريس الحديثة بين النظرية والتطبيق لتدريس مادة الجغرافية دراسة تحليلية لمدارس التعليم الثانوي بمسلاته نموذجاً	34

433-445	فريال فتحي مجد الصياح	أسلوب تحليل النظم " المفاهيم والاهداف في مواجهة التقدم العلمي والتكنلوجي"	35
446-452	Afifa Milad Omeman	Antibacterial activities and phytochemical analysis of leafextracts of *Iphiona scabra*plant used as traditional medicines in ALKHUMS-LIBYA	36
453-461	Hameda Ali Abrass	Rutherford backscattering spectrometry (review)	37
462-475	Mohammed Abuojaylah Albarki Salem Msaoud Adrugi Tareg Abdusalam Elawaj Milad Mohamed Alhwat	The challenges associated with distance education in Libyan universities during the COVID 19 pandemic: Empirical study	38
476-488	حمزة مسعود ماكاري عمر عبد الله الدرويش	التعريف بابن أبي حجلة التلمساني وكتابه مغناطيس الدّر النفيس	39
489-493	هدية سليمان هويـدي مرام يوسـف نجي سالمة عبدالحميد هندي	معوقات استخدام التعليم الإلكتروني في ظل جائحة كورونا بالجامعة الأسمرية	40
494-503	هشام علي مرعي فرج احمد الفرطاس	المعرفة الحسية والعقلية عند ابن سينا	41
504-511	Mohammed Altahir Salem Mustafa Aldeep	Use of E-Learning Innovation in Learning Implementation	42
512-519	Abdusalam Yahya Mustafa Almahdi Algaet	Investigate the Effect of Video Conferencing Traffic on the Performance of WiMAX Technology	43
520-526	Abdelmola M. Odan Ahmad M. Dabah Saleh O. Handi Ibrahim M. Haram	Kinetic Model of Methanol to Gasoline (MTG) Reactions over H-Beta,H-ZSM5 and CuO/H-BetaCatalysts	44
527-537	Munayr Mohammed Amir Melad Al-Daeef	Performance Evaluation of Blacklist and Heuristic Methods in Phishing Emails Detection	45
538-555	فرج مجد طيب علي محمود خير الله شحاته إسماعيل الشريف	الأمر بالأوجه لإقامة الدعوى الجنائية (الطبيعة القانونية للأمر بالاوجه، السلطات المختصة بإصداره)	46
556-567	أسامة عبد الواحد البكوري ريم فرج بوغرارة	توظيف القوالب الجبسية في الأعمال الخزفية	47
568-578	سعد الشيباني اجدير	علم الفيزياء (نقطة تحول في مسار العلم في فلسفة القرن العشرين)	48
579-603	حسن السنوسي مجد الشريف حسين الهادي مجد الشريف	تربوت وأخواته	49
604-619	مجد سالم مفتاح كعبار	حول مشروع الترسانة البحرية وعلاقته بتوظيف الموارد البشرية وخلق فرص عمل (المقترح وآليات التنفيذ)	50
620-634	أسامة إبراهيم مجد المصراتي	المصلحة وأثرها في تقدير العقوبات التعزيرية	51
635-657	إمجد انويجي غميض أحمد حسين الشريف محمود عبد المجيد مجبر	الحروب الصليبية (المفهوم والأسباب)	52