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Degree-based topological indices of polytetrafluoroethylene via *M*-polynomial

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Abstract

The *M*-polynomial is important in deriving degree-based topological indices which predict different chemical and physical characteristics of the material. This article computes degree-based topological indices of polytetrafluoroethylene and provides a graphical representation of these indices and the *M*–polynomial.

Subject Classification (2010): *05C09, 05C92, 05C90.*

Keywords: *Degree-based topological index, Zagreb index, Randic index, Graph polynomial.*

1. Introduction

This paper examines a simple connected graph. The degree of a vertex is the number of edges connecting it to it [3]. It is represented by d_v. The physical and chemical characteristics of substances are identified using chemical graph theory. We begin by investigating the M- polynomial [5, 7, 8], which is useful in

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determining the degree-based topological indices of graphs. The M-polynomial of graph G is $M(G; a, b) = \sum_{\delta \le i \le j \le \Delta} m_{ij}(G) a^i b^j$, where m_{ij} is the total number of edges uv, vertex u having degree i and vertex v having degree j and δ denotes minimum degree of the graph and Δ denotes maximum degree of the graph. Topological indices [2, 5] are mathematical concepts that represent the structure of molecules as graphs. The vertices of these graphs correspond to the atoms, while the edges reflect the bonds between these atoms. Topological indices serve as a valuable instrument in QSAR and QSPR investigations. We take the chemical compound polytetrafluoroethylene (PTFE) [6]. For instance, [1] explored the topological indices of H-Naphthalenic nanotubes, highlighting their utility in characterizing the structure and potential applications of these advanced materials.A significant advancement in this area was made in [4], where the authors derived a closed form for the M-polynomial of PETAA dendrimers. PTFE $[CF_2 - CF_2]_n$ has the same chemical structure as polyethylene, except that the hydrogen atoms have been completely replaced by fluorine. We determine many degree-based topological indices for PTFE utilizing the M-polynomial, show a graphical depiction of these indices, and compare the values of the degree-based topological indices for $(CF_2), (CF_2)_2, (CF_2)_3, (CF_2)_4, (CF_2)_5$.

2. *M*-polynomial of $(CF_2)_n$

Theorem 2.1: *If* G *be a* $(CF_2)_n$ graph then M-polynomial of G *is*

$$M[G; a, b] = 4ab^3 + (2n-4)ab^4 + 2a^3b^4 + (n-3)a^4b^4, n \ge 3.$$

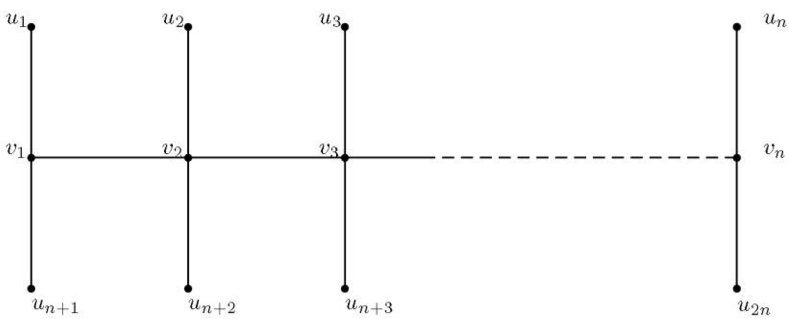
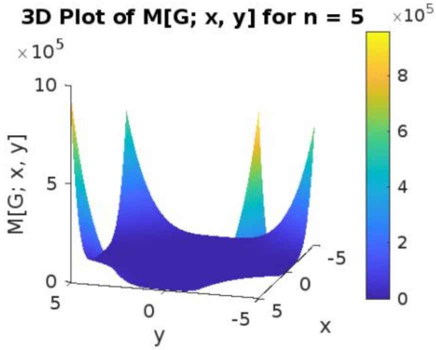


Figure 1
Polytetrafluoroethylene graph

Let $G = (CF_2)_n$ be a graph. The given figure 1 depicts the degree of the points. $d_G(v_1) = d_G(v_n) = 3; d_G(v_2) = d_G(v_3) = \cdots = d_G(v_{n-1}) = 4; d_G(u_1) = d_G(u_2) = \cdots = d_G(u_{n+1}) = \cdots = d_G(u_2 n) = 1$. Edge partition of G are

$$E_{1,3} = \{uv \in G: d_u = 1, d_v = 3\}$$
$$E_{1,4} = \{uv \in G: d_u = 1, d_v = 4\}$$
$$E_{3,4} = \{uv \in G: d_u = 3, d_v = 4\}$$
$$E_{4,4} = \{uv \in G: d_u = 4, d_v = 4\}$$

$$m_{13} = |E_{1,3}| = 4$$
$$m_{14} = |E_{1,4}| = 2n - 4$$
$$m_{34} = |E_{3,4}| = 2$$
$$m_{44} = |E_{4,4}| = n - 3$$



$$M[G; a, b] = \sum_{\delta \le i \le j \le \Delta} m_{ij}(G) a^i b^j$$
$$= \sum_{1 \le i \le j \le 4} m_{ij}(G) a^i b^j$$
$$= \sum_{1 \le 3} m_{13} ab^3 + \sum_{1 \le 4} m_{14} ab^4 + \sum_{3 \le 4} m_{34} a^3 b^4 + \sum_{4 \le 4} m_{44} a^4 b^4$$
$$M[G; a, b = 4ab^3 + (2n-4)ab^4 + 2a^3 b^4 + (n-3)a^4 b^4, n \ge 3 \quad (1)$$

3. Topological indices of $(CF_2)_n$

We compute several topological invariants using the M-polynomial derived in the preceding section of $(CF_2)_n$. The calculation of degree-based topological indices presented in Table 1 in [7].

Theorem 3.1: *If* $G = (CF_2)_n$ *graph and*

$$M[G; a, b] = 4ab^3 + (2n-4)ab^4 + 2a^3 b^4 + (n-3)a^4 b^4, n \ge 3$$

then

(1) $M_1[G] = 18n - 14.$
(2) $M_2[G] = 24n - 28.$
(3) ${}^{m}M_2[G] = \frac{27n+15}{48}.$
(4) $R_\alpha[G] = 4.3^\alpha + 4^\alpha(2n-4) + 2.(12)^\alpha + 4^2\alpha(n-3)4.$
(5) $RR_\alpha[G] = \frac{4}{3^\alpha} + \frac{2n-4}{4^\alpha} + \frac{2}{12^\alpha} + \frac{n-3}{4^2\alpha}.$
(6) $H[G] = \frac{31+147n}{140}.$
(7) $SSD[G] = \frac{33+53n}{6}.$
(8) $A[G] = \frac{27}{2} + \frac{4^3}{3^3}(2n-4) + \frac{2.(12)^3}{5^3} + \frac{4^6(n-3)}{3^3}.$

(9) $I[G] = \frac{126n-97}{35}$.

(10) $ABC[G] = \frac{4\sqrt{2}+\sqrt{5}}{\sqrt{3}} + \frac{4\sqrt{3}n-8\sqrt{3}+\sqrt{6}n-3\sqrt{6}}{4}$.

(11) $GA[G] = \frac{110\sqrt{3}-217+91n}{35}$.

(12) $B_1[G] = 42n - 38$.

(13) $B_2[G] = 78n - 102$.

(14) $HB_1[G] = 330n - 417$.

(15) $HB_2[G] = 1458n - 2658$.

(16) ${}^{m}B_1[G] = \frac{11(n-2)}{14} + \frac{101}{36}$.

(17) ${}^{m}B_2[G] = \frac{185+55n}{60}$.

(18) $H_b[G] = \frac{69n-152}{35}$.

Proof: Here we consider

$$M[G;a,b] = h(a,b) = 4ab^3 + (2n-4)ab^4 + 2a^3b^4 + (n-3)a^4b^4, n \geq 3,$$

(1) The first Zagreb index

$$D_a h(a,b) = 4ab^3 + (2n-4)ab^4 + 6a^3b^4 + 4(n-3)a^4b^4,$$

$$D_b h(a,b) = 12ab^3 + 4(2n-4)ab^4 + 8a^3b^4 + 4(n_3)a^4b^4,$$

$$(D_a + D_b)[h(a,b)] = 16ab^3 + 5(2n-4)ab^4 + 14a^3b^3 + 8(n-3)a^4b^4,$$

$$M_1[G] = (D_a + D_b)[h(a,b)]_{a=b=1} = 18n - 14.$$

(2) The second Zagreb index

$$D_aD_b h(a,b) = 12ab^3 + 4(2n-4)ab^4 + 24a^3b^4 + 16(n-3)a^4b^4,$$

$$M_2[G] = (D_aD_b)[h(a,b)]_{a=b=1} = 24n - 28.$$

(3) The modified second Zagreb index

$$S_b h(a,b) = \frac{4}{3}ab^3 + \frac{(2n-4)}{4}ab^4 + \frac{2}{4}a^3b^4 + \frac{(n-3)}{4}a^4b^4,$$

$$S_aS_b h(a,b) = \frac{4}{3}ab^3 + \frac{2n-4}{4}ab^4 + \frac{2}{12}a^3b^4 + \frac{n-3}{16}a^4b^4,$$

$${}^{m}M_2[\mathrm{G}] = (S_aS_b)[h(a,b)]_{a=b=1} = \frac{27n+15}{48}.$$

(4) The general Randic index

$$D_b^{\alpha} h(a,b) = 4.3^{\alpha}ab^3 + a^{\alpha}(2n-4)ab^4 + 2.4^{\alpha}a^3b^4 + 4^{\alpha}(n-3)a^4b^4,$$

$$D_a^{\alpha}D_b^{\alpha} h(a,b) = 4.3^{\alpha}ab^3 + 4^{\alpha}(2n-4)ab^4 + 2.12^{\alpha}a^3b^4 + 4^{2\alpha}(n-3)a^4b^4,$$

$${}^{m}M_2[\mathrm{G}] = (D_a^{\alpha}D_b^{\alpha})h(a,b)_{a=b=1} = 4.3^{\alpha} + 4^{\alpha}(2n-4) + 2.12^{\alpha} + 4^{2\alpha}(n-3).$$

(5) The Inverse Randic index

$$S_b^{\alpha}h(a,b) \;=\; \tfrac{4}{3^{\alpha}}ab^3 + \tfrac{2n-4}{4^{\alpha}}ab^4 + \tfrac{2}{4^{\alpha}}a^3b^4 + \tfrac{n-3}{4^{\alpha}}a^4b^4,$$

$$S_a^{\alpha}S_b^{\alpha}h(a,b) \;=\; \tfrac{4}{3^{\alpha}}ab^3 + \tfrac{2n-4}{4^{\alpha}}ab^4 + \tfrac{2}{12^{\alpha}}a^3b^4 + \tfrac{n-3}{4^{2\alpha}}a^4b^4,$$

$$RR_{\alpha}[G] \;=\; (S_a^{\alpha}S_b^{\alpha})[h(a,b)]_{a=b=1} = \tfrac{4}{3^{\alpha}} + \tfrac{2n-4}{4^{\alpha}} + \tfrac{2}{12^{\alpha}} + \tfrac{n-3}{4^{2\alpha}}.$$

(6) The harmonic index

$$Jh(a,b) \;=\; 4a^4 + (2n-4)a^5 + 2a^7 + (n-3)a^8,$$

$$S_aJh(a,b) \;=\; a^4 + \tfrac{2n-4}{5}a^5 + \tfrac{2}{7}a^7 + \tfrac{n-3}{8}a^8,$$

$$2S_aJh(a,b) \;=\; 2a^4 + \tfrac{2(2n-4)}{5}a^5 + \tfrac{4}{7}a^7 + \tfrac{n-3}{4}a^8,$$

$$H[G] \;=\; 2S_aJ[h(a,b)] = \tfrac{31+147n}{140}.$$

(7) The symmetric division index

$$D_aS_bh(a,b) \;=\; \tfrac{4}{3}ab^3 + \tfrac{2n-4}{4}ab^4 + \tfrac{3}{2}a^3b^4 + (n-3)a^4b^4,$$

$$S_aD_bh(a,b) \;=\; 12ab^3 + 4(2n-4)ab^4 + \tfrac{8}{3}a^3b^4 + (n-3)a^4b^4,$$

$$SSD[G] \;=\; (D_aS_b + S_aD_b)[h(a,b)]_{a=b=1} = \tfrac{33+53n}{6}.$$

(8) The augmented index

$$D_b^3h(a,b) \;=\; 4.3^3ab^3 + 4^3(2n-4)ab^4 + 2.4^3a^3b^4 + 4^3(n-3)a^4b^4,$$

$$D_a^3D_b^3h(a,b) \;=\; 4.3^3ab^3 + 4^3(2n-4)ab^4 + 2.12^3a^3b^4 + 4^6a^4b^4,$$

$$JD_a^3D_b^3h(a,b) \;=\; 4.3^3a^4 + 4^3(2n-4)a^5 + 2.12^3a^7 + 4^6a^8,$$

$$Q_{(-2)}JD_a^3D_b^3h(a,b) \;=\; 4.3^3a^2 + 4^3(2n-4)a^3 + 2.12^3a^5 + 4^6a^6,$$

$$S_a^3Q_{(-2)}JD_a^3D_b^3h(a,b) \;=\; \tfrac{4.3^3}{2^3}a^2 + \tfrac{4^3(2n-4)}{3^3}a^3 + \tfrac{2.12^3}{5^3}a^5 + \tfrac{4^6(n-3)}{6^3}a^6,$$

$$A[G] \;=\; S_a^3Q_{(-2)}JD_a^3D_b^3[h(a,b)]_{a=b=1} = \tfrac{4.3^3}{2^3} + \tfrac{4^3}{3^3}(2n-4) + \tfrac{2.12^3}{5^3} + \tfrac{4^6}{6^3}.$$

(9) The inverse sum index

$$(JD_aD_b)h(a,b) \;=\; 12a^4 + 4(2n-4)a^5 + 24a^7 + 16(n-3)a^8,$$

$$(S_aJD_aD_b)h(a,b) \;=\; 3a^4 + \tfrac{4(2n-4)}{5}a^5 + \tfrac{24}{7}a^7 + 2(n-3)a^8,$$

$$I[G] \;=\; S_aJD_aD_b)[h(a,b)] = \tfrac{126n-97}{35}.$$

(10) The atom-bond connectivity index

$$S_a^{1/2}S_b^{1/2}h(a,b) \;=\; \tfrac{4}{\sqrt{3}}ab^3 + (n-2)ab^4 + \tfrac{1}{\sqrt{3}}a^3b^4 + \tfrac{n-3}{4}a^4b^4,$$

$$JS_a^{1/2}S_b^{1/2}h(a,b) \;=\; \tfrac{4}{\sqrt{3}}a^4 + (n-2)a^5 + \tfrac{1}{\sqrt{3}}a^7 + \tfrac{n-3}{4}a^8,$$

$$Q(-2)JS_a^{1/2}S_b^{1/2}h(a,b) = \frac{4}{\sqrt{3}}a^2 + (n-2)a^3 + \frac{1}{\sqrt{3}}a^5 + \frac{n-3}{4}a^6,$$
$$D_a^{1/2}Q(-2)JS_a^{1/2}S_b^{1/2}h(a,b) = \frac{4.\sqrt{2}}{\sqrt{3}}a^2 + \sqrt{3}(n-2)a^3 + \frac{\sqrt{5}}{\sqrt{3}}a^5 + \frac{\sqrt{6}(n-3)}{4}a^6,$$
$$ABC[G] = D_a^{1/2}Q_(-2)JS_a^{1/2}S_b^{1/2}[h(a,b)]_{a=b=1},$$
$$= \frac{4\sqrt{2}+\sqrt{5}}{\sqrt{3}} + \frac{4\sqrt{3}n-8\sqrt{3}+\sqrt{6}n-3\sqrt{6}}{4}.$$

(11) The geometric arithmetic index

$$D_a^{1/2}D_b^{1/2}h(a,b) = 4.\sqrt{3}ab^3 + 2.(2n-4)ab^4 + 4.\sqrt{3}a^3b^4 + 4(n-3)a^4b^4,$$
$$JD_a^{1/2}D_b^{1/2}h(a,b) = 4.\sqrt{3}a^4 + 2.(2n-4)a^5 + 4.\sqrt{3}a^7 + 4(n-3)a^8,$$
$$S_aJD_a^{1/2}D_b^{1/2}h(a,b) = \sqrt{3}a^4 + \frac{2}{5}(2n-4)a^5 + \frac{4\sqrt{3}}{7}a^7 + \frac{(n-3)}{2}a^8,$$
$$2S_aJD_a^{1/2}D_b^{1/2}h(a,b) = 2.\sqrt{3}a^4 + \frac{4}{5}(2n-4)a^5 + \frac{8\sqrt{3}}{7}a^7 + (n-3)a^8,$$
$$GA[G] = 2S_aJD_a^{1/2}D_b^{1/2}[h(a,b)]_{a=b=1},$$
$$= \frac{110\sqrt{3}-217+91n}{35}.$$

(12) The first K Banhatti index

$$(D_a+D_b)h(a,b) = 18n-14,$$
$$2D_aQ(-2)Jh(a,b) = 16a^2 + 6(2n-4)a^3 + 20a^5 + 12(n-3)a^6,$$
$$B_1[G] = 2D_aQ(-2)Jh(a,b)_{a=1},$$
$$= 42n-38.$$

(13) The second K Banhatti index

$$J(D_a+D_b)h(a,b) = 16a^4 + 5(2n-4)a^5 + 14a^7 + 8(n-3)a^8,$$
$$D_aQ(-2)J(D_a+D_bh(a,b) = 32a^2 + 15(2n-4)a^3 + 70a^5 + 48(n-3)a^6,$$
$$B_2[G] = D_aQ(-2)J(D_a+D_b)[h(a,b)]_{a=1},$$
$$= 78n-102.$$

(14) The first K hyper Banhatti index

$$(D_a^2+D_b^2)h(a,b) = 40ab^3 + 17(2n-4)ab^4 + 50a^3b^4 + 32(n-3)a^4b^4,$$
$$2D_a^2Q(-2)Jh(a,b) = 32a^2 + 18(2n-4)a^3 + 100a^5 + 72(n-3)a^6,$$
$$2D_aQ(-2)J(D_a+D_b)h(a,b) = 64a^2 + 30(2n-4)a^3 + 140a^5 + 96(n-3)a^6,$$
$$HB_1[G] = (D_a^2+D_b^2+2D_a^2Q_(-2)J + 2D_aQ(-2)J(D_a+D_b))[h(a,b)],$$
$$= 330n-417.$$

(15) The second K hyper Banhatti index

$$J(D_a^2+D_b^2)h(a,b) = 40a^4 + 17(2n-4)a^5 + 50a^7 + 32(n-3)a^8,$$

$$Q(-2)J(D_a^2 + D_b^2)h(a,b) = 40a^2 + 17(2n-4)a^3 + 50a^5 + 32(n-3)a^6,$$

$$D_a^2 Q(-2)J(D_a^2 + D_b^2)h(a,b) = 160a^2 + 153(2n-4)a^3 + 1250a^5 + 1152(n-3)a^6,$$

$$HB_2[G] = D_a^2 Q(-2)J(D_a^2 + D_b^2)[h(a,b)]_{a=1}, = 1458n - 2658.$$

(16) Modified first K Banhatti index

$$L_a h(a,b) = 4a^2b^3 + (2n-4)a^2b^4 + 2a^6b^4 + (n-3)a^8b^4,$$

$$L_b h(a,b) = 4ab^6 + (2n-4)ab^8 + 2a^3b^8 + (n-3)a^4b^8,$$

$$J(L_a + L_b)h(a,b) = 4a^5 + (2n-4)a^6 + 2a^10 + 4a^7 + (2n-4)a^9 + 2a^11 + 2(n-3)a^12,$$

$$Q(-2)J(L_a + L_b)h(a,b) = 4a^3 + (2n-4)a^4 + 4a^5 + (2n-4)a^7 + 2a^8 + 2a^9 + 2(n-3)a^10,$$

$$S_a Q(-2)J(L_a + L_b)h(a,b) = \frac{4}{3}a^3 + \frac{2n-4}{4}a^4 + \frac{4}{5}a^5 + \frac{2n-4}{7}a^7 + \frac{1}{8}a^8 + \frac{2}{9}a^9 + \frac{n-3}{5}a^10,$$

$$^mB_1[G] = S_a Q(-2)J(L_a + L_b)[h(a,b)]_{a=1}, = \frac{11(n-2)}{14} + \frac{101}{36}.$$

(17) Modified second K Banhatti index

$$(S_a + S_b)h(a,b) = \frac{16}{3}ab^3 + \frac{10(n-2)}{4}ab^4 + \frac{7}{6}a^3b^4 + \frac{n-3}{2}a^4b^4,$$

$$J(S_a + S_b)h(a,b) = \frac{16}{3}a^4 + \frac{10(n-2)}{4}a^5 + \frac{7}{6}a^7 + \frac{n-3}{2}a^8,$$

$$S_a Q(-2)J(S_a + S_b)h(a,b) = \frac{8}{3}a^2 + \frac{5(n-2)}{6}a^3 + \frac{7}{30}a^5 + \frac{n-3}{12},$$

$$^mB_2[G] = S_a Q(-2)J(S_a + S_b)[h(a,b)]_{a=1}, = \frac{185+55n}{60}.$$

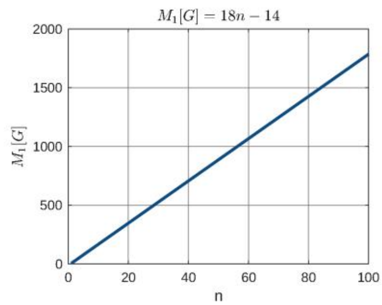
(18) Harmonic K Banhatti index

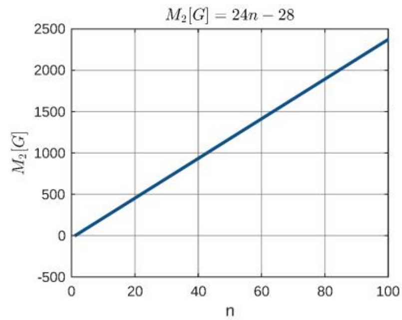
$$2S_a Q(-2)J(L_a + L_b)h(a,b) = \frac{8}{3}a^3 + (n-2)a^4 + \frac{8}{5}a^5 + \frac{4(n-2)}{7}a^7 + \frac{1}{8}a^8 + \frac{4}{9}a^9 + \frac{2(n-3)}{5}a^10,$$

$$H_b[G] = 2S_a Q(-2)J(L_a + L_b)[h(a,b)]_{a=1}, = \frac{69n-152}{35}.$$

4. Comparison of Topological indices

We calculate the topological index values for CF_2, $(CF_2)_2$, $(CF_2)_3$, $(CF_2)_4$, $(CF_2)_5$ in this section.


$M_1[G] = 18n - 14$
$M_1[G]$
n
0 500 1000 1500 2000
0 20 40 60 80 100


$M_2[G] = 24n - 28$
$M_2[G]$
n
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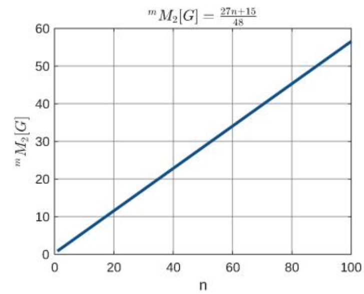
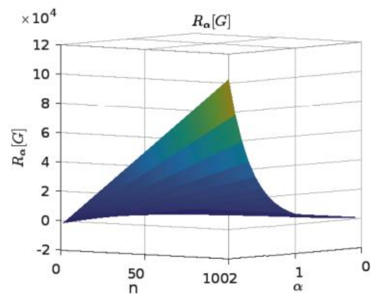
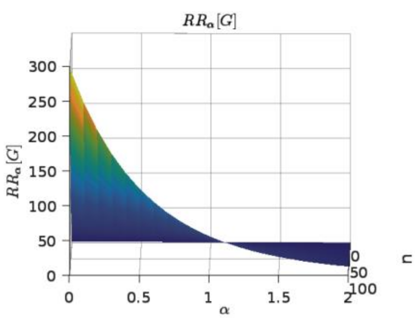
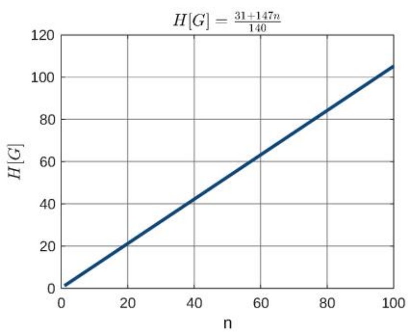
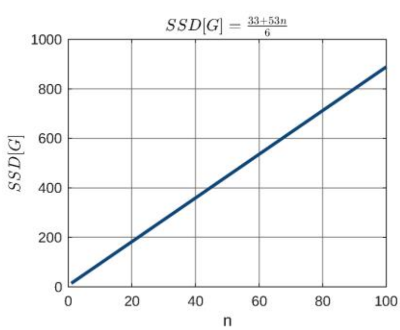
0 20 40 60 80 100

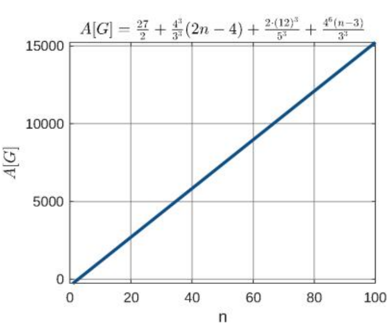

${}^{m}M_2[G] = \frac{27n+15}{48}$
${}^{m}M_2[G]$
n
0 10 20 30 40 50 60
0 20 40 60 80 100

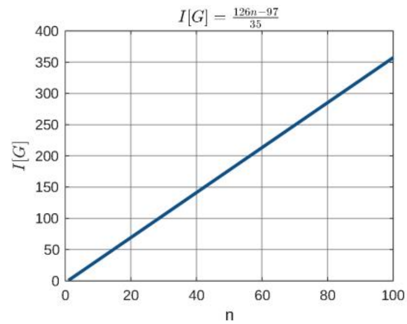

$R_{\alpha}[G]$
$\times 10^4$
$R_{\alpha}[G]$
-2 0 2 4 6 8 10 12
n
0 50 100
α
2 1 0

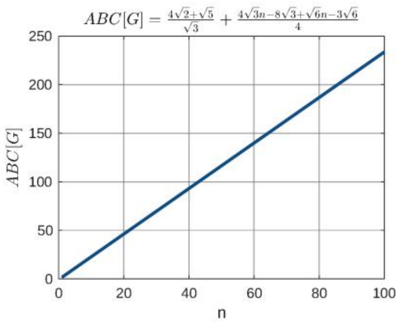

$RR_{\alpha}[G]$
$RR_{\alpha}[G]$
0 50 100 150 200 250 300
α
0 0.5 1 1.5 2
n
0 50 100

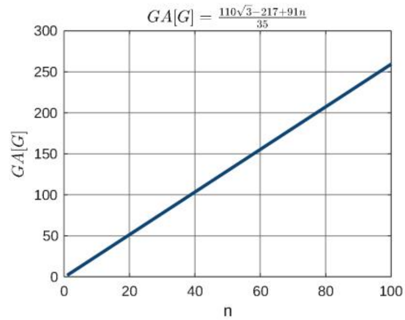

$H[G] = \frac{31+147n}{140}$
$H[G]$
n
0 20 40 60 80 100 120
0 20 40 60 80 100

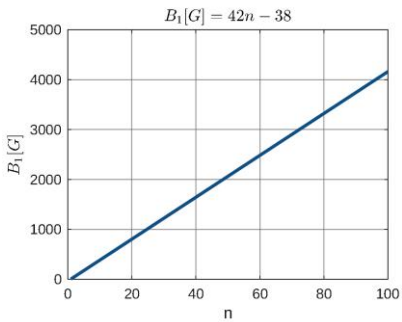

$SSD[G] = \frac{33+53n}{6}$
$SSD[G]$
n
0 200 400 600 800 1000
0 20 40 60 80 100

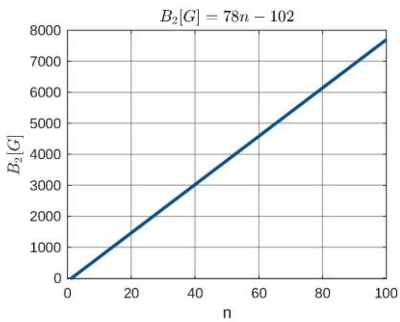

$A[G] = \frac{27}{2} + \frac{4^3}{3^3}(2n-4) + \frac{2\cdot(12)^3}{5^3} + \frac{4^6(n-3)}{3^3}$
$A[G]$
n
0 5000 10000 15000
0 20 40 60 80 100

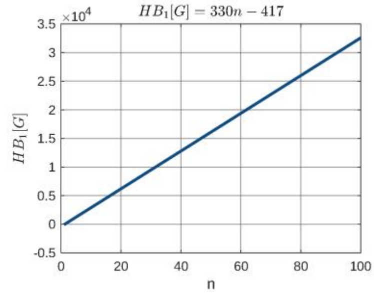

$I[G] = \frac{126n-97}{35}$
$I[G]$
n

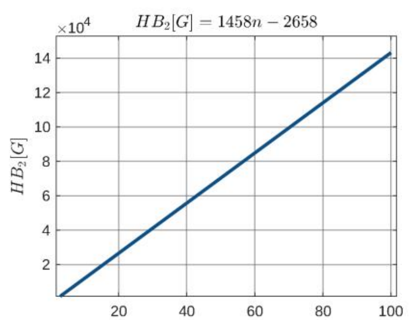

$ABC[G] = \frac{4\sqrt{2}+\sqrt{5}}{\sqrt{3}} + \frac{4\sqrt{3}n-8\sqrt{3}+\sqrt{6}n-3\sqrt{6}}{4}$
$ABC[G]$
n

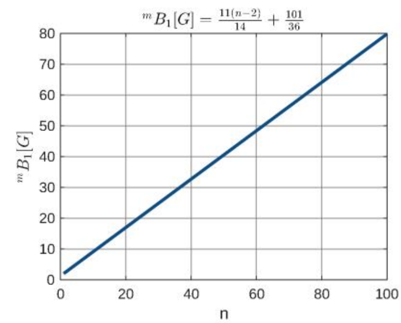

$GA[G] = \frac{110\sqrt{3}-217+91n}{35}$
$GA[G]$
n

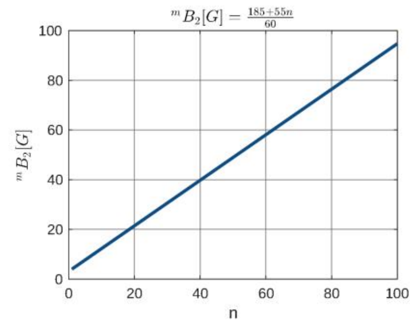

$B_1[G] = 42n - 38$
$B_1[G]$
n


$B_2[G] = 78n - 102$
$B_2[G]$
n


$\times 10^4$
$HB_1[G] = 330n - 417$
$HB_1[G]$
n


$\times 10^4$
$HB_2[G] = 1458n - 2658$
$HB_2[G]$
n


${}^{m}B_1[G] = \frac{11(n-2)}{14} + \frac{101}{36}$
${}^{m}B_1[G]$
n



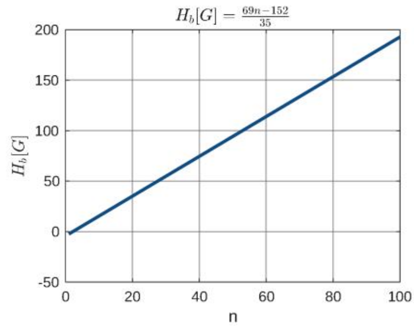


Table 1

Values for the topological indices of $(CF_2), (CF_2)_2, (CF_2)_3, (CF_2)_4, (CF_2)_5$.

Topological indices	CF_2	$(CF_2)_2$	$(CF_2)_3$	$(CF_2)_4$	$(CF_2)_5$
$M_1[G]$	4	22	40	58	76
$M_2[G]$	-4	20	44	68	92
${}^{m}M_2[G]$	0.875	1.437	2	2.562	3.125
$H[G]$	1.271	2.321	3.371	4.421	5.471
$SSD[G]$	14.33	23.16	32	40.80	49.66
$I[G]$	0.828	4.428	8.028	11.628	15.228
$ABC[G]$	1.6	3.9	6.288	8.632	10.955
$GA[G]$	1.843	4.443	7.04	9.64	12.24
$B_1[G]$	4	6	88	138	172
$B_2[G]$	-24	54	132	210	288
$HB_1[G]$	-87	243	573	903	1233
$HB_2[G]$	-1200	258	1716	3174	4672
${}^{m}B_1[G]$	2.020	2.805	3.590	4.376	4.714
${}^{m}B_2[G]$	4	4.92	5.83	6.75	7.67
$H_b[G]$	-2.37	-0.4	1.57	3.54	5.54

5. Conclusion

The M-polynomial and topological indices of polytetrafluoroethylene (PTFE) were derived, and the degree-based topological indices for $(CF_2), (CF_2)_2, (CF_2)_3, (CF_2)_4, (CF_2)_5$ were computed. The topological indices indicate the characteristics of polytetrafluoroethylene.

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