

248 published or accepted papers

- [1] G.C. Lau and W.C. Shiu, On join product and local antimagic chromatic number of regular graphs, to appear in *Acta Math. Hungar.*, (accept at Nov 25, 2022).
- [2] K. Premalatha, G.C. Lau, S. Arumugam and W.C. Shiu, On local antimagic chromatic number of various join graphs, *Commun. Comb. Optim.*, accepted at Aug 18, 2022.
- [3] G.C. Lau, W.C. Shiu and H.K. Ng, On local antimagic chromatic number of graphs with cut-vertices, to appear in *Iran. J. Math. Sci. Inform.* (accepted at Feb. 19, 2022).
- [4] Z-B. Gao, W.C. Shiu, S-M. Lee, F. Wang and G-Y. Sun, Full edge-friendly index sets of one point union of cycles, to appear in *ARS Combin.*, (2021) (accepted at Dec. 4, 2018).
- [5] H. Chen, J. Li and W.C. Shiu, Some results on the A_α -eigenvalues of a graph, *Linear Multilinear Algebra*, Online: Oct. 18, 2022. DOI: 10.1080/03081087.2022.2135676
- [6] Y. Yang, W-F. Wang, W.C. Shiu and M. Chen, On the cyclic coloring of subcubic plane graphs, *Adv. Math. (China)*, **51(5)**, 807-816 (2022).
- [7] G.C. Lau, W.C. Shiu and H.K. Ng, On k -super graceful labeling of graphs, *Thai. J. Math.*, **20(3)**, 1375-1387 (2022).
- [8] W.C. Shiu and R.M. Low, On the integer-antimagic spectra of non-Hamiltonian graphs, *Theory Appl. Graphs*, **9(2)**, Article 8, (2022).
- [9] P. Huang, J. Li and W.C. Shiu, Maximizing the A_α -spectral radius of graphs with given size and diameter, *Linear Algebra Appl.*, **651**, 116-130 (2022).
- [10] Q. Wu and W.C. Shiu, $L(1, d)$ -labeling number of direct product of two cycles, *J. Discrete Math. Sci. Cryptogr.*, Online: May 24, 2022. DOI:10.1080/09720529.2021.1930652
- [11] J. Li, G.C. Lau and W.C. Shiu, On Modulo Local Antimagic Chromatic Number of Graphs, *J. Discrete Math. Sci. Cryptogr.*, Online: May 6, 2022. <https://doi.org/10.1080/09720529.2021.1880691>
- [12] G.C. Lau, J. Li and W.C. Shiu, Approaches which output infinitely many graphs with small local antimagic chromatic number, *Discrete Math. Algorithms Appl.*, Online: April 18, 2022. DOI: 10.1142/S1793830922500793 <https://arxiv.org/abs/2009.01996>
- [13] G.C. Lau, W.C. Shiu and C.X. Soo, On Local Antimagic Chromatic Number of Spider Graphs, *J. Discrete Math. Sci. Cryptogr.*, Online: March 7, 2022. <https://doi.org/10.1080/09720529.2021.1892270>
- [14] H. Jia and W.C. Shiu, Distance signless Laplacian spectrum of a graph, *Front. Math. China*, Online: Oct 28, 2021. <https://doi.org/10.1007/s11464-021-0986-6>
- [15] G.C. Lau, W.C. Shiu and H.K. Ng, On number of pendants in local antimagic chromatic number, *J. Discrete Math. Sci. Cryptogr.*, Online: June 23, 2021. <https://doi.org/10.1080/09720529.2021.1920190>
- [16] S. Wei, W.C. Shiu, X. Ke and J. Huang, Comparison of the Wiener and Kirchhoff indices of random pentachains, *J. Math.*, Volume 2021, Article ID 7523214 (2021). <https://doi.org/10.1155/2021/7523214>
- [17] W.C. Shiu and G.C. Lau, On SD-prime labelings of some one point unions of gears, *Symmetry*, (2021), **13(5)**, 849. <https://doi.org/10.3390/sym13050849>
- [18] W.C. Shiu, G.C. Lau and H.K. Ng, Edge-coloring vertex-weighting of graphs, *Iran. J. Math. Sci. Inform.*, **16(1)**, 1-13 (2021).

- [19] Z-B. Gao, G.C. Lau, W.C. Shiu, Graphs with minimal strength, *Symmetry*, (2021), **13(3)**, 513.
<https://doi.org/10.3390/sym13030513>, <http://arxiv.org/abs/2103.00724>
- [20] P. Huang, J. Li and W.C. Shiu, Maximizing the signless Laplacian spectral radius of k -connected graphs with given diameter, *Linear Algebra Appl.*, **617**, 78-99 (2021).
- [21] G.C. Lau, W.C. Shiu and H.K. Ng, On local antimagic chromatic number of cycle-related join graphs, *Discuss. Math. Graph Theory*, **41**, 133-152 (2021). ArXiv: <http://arxiv.org/abs/1805.04888>
- [22] G.C. Lau, H.K. Ng and W.C. Shiu, Cartesian magicness of 3-dimensional boards, *Malaya J. Matematik*, **8(3)**, 1175-1185 (2020). <https://doi.org/10.26637/MJM0803/0077>.
- [23] G.C. Lau, H.K. Ng and W.C. Shiu, Affirmative solutions on local antimagic chromatic number, *Graphs Combin.*, **36**, 1337-1354 (2020). <https://doi.org/10.1007/s00373-020-02197-2>
- [24] M. Chen, Y. Fan, A. Raspaud, W.C. Shiu and W-F. Wang, Choosability with separation of planar graphs without prescribed cycle, *Appl. Math. Comput.*, **367**, #124756, (2020).
- [25] W.C. Shiu and R.M. Low, Orthogonal embeddings of graphs in Euclidean space, *Electron. J. Graph Theory Appl.*, **7(2)**, 373-381 (2019).
- [26] G.C. Lau, S-M. Lee and W.C. Shiu, On edge-prime cubic graphs with small components, *Open J. Discrete Appl. Math.*, **2(2)**, 48-58 (2019).
- [27] S. Wei and W.C. Shiu, Enumeration of Wiener indices in random polygonal chains, *J. Math. Anal. Appl.*, **469**, 537-548 (2019).
- [28] Q. Li, W.C. Shiu, P.K. Sun and D. Ye, On the anti-Kelulé problem of cubic graphs, *The Art of Discrete and Applied Mathematics*, **2**, #P1.05, (2019).
- [29] J. Huo, W.C. Shiu and W-F. Wang, The neighbor expanded sum distinguishing index of Halin graphs, *Ars Combin.*, **141**, 63-73 (2018).
- [30] S. Wei and W.C. Shiu, The number of perfect matching in random polyazulenoid chains, *J. Combin. Math. Combin. Comput.*, **105**, 21-33 (2018).
- [31] J-M. Guo, Z-W. Wang, J. Li, W.C. Shiu and P-P. Tong, Corrigendum to “The effect on eigenvalues of connected graphs by adding edges” [Linear Algebra Appl. 548 (2018) 57-65], *Linear Algebra Appl.*, **555**, 434-436 (2018).
- [32] W.C. Shiu, Integer-antimagic spectra of disjoint unions of cycles, *Theory and Appl. of Graphs*, **5:Iss. 2**, Article 3, (2018).
- [33] J-M. Guo, P-P. Tong, J. Li, W.C. Shiu and Z-W. Wang, The effect on eigenvalues of connected graphs by adding edges, *Linear Algebra Appl.*, **548**, 57-65 (2018).
- [34] G.C. Lau and W.C. Shiu, On SD-prime Labeling of Graphs, *Util. Math.*, **106**, 149-164 (2018).
- [35] Y. Wang, W.C. Shiu, W-F. Wang and M. Chen, Plane graphs with maximum degree 4 are strongly 19-edge-colorable, *Discrete Math.*, **341**, 1629-1635 (2018).
- [36] J. Li, J-M. Guo, W.C. Shiu, Ş.B.B. Altındağ and D. Bozkurt, Bounding the sum of powers of normalized Laplacian eigenvalues of a graph, *Appl. Math. Comput.*, **324**, 82-92 (2018).
- [37] W.C. Shiu and R.M. Low, The Integer-magic spectra and null sets of the Cartesian product of two trees, *Australas. J. Combin.*, **70**, 157-167 (2018).

- [38] W.C. Shiu, Integer-antimagic spectra of fan, wheel and gear graphs, *J. Comb. Number Theory*, **9**, 229-238 (2017).
- [39] W.C. Shiu, G.C. Lau and S-M. Lee, On (Semi-)edge-primality graphs, *Iran. J. Math. Sci. Inform.*, **12(1)**, 1-14 (2017).
- [40] J-M. Guo, J. Li, P. Huang and W.C. Shiu, Coefficients of the characteristic polynomial of the (signless, normalized) Laplacian of a graph, *Graphs Combin.*, **33**, 1155-1164 (2017).
- [41] P. Huang, W.C. Shiu and P.K. Sun, A relationship between the walks and the semi-edge walks of graphs, *J. Math. Res. Appl.*, **37**, 520-526 (2017).
- [42] Q. Wu and W.C. Shiu, Circular $L(j, k)$ -labeling numbers of square paths, *J. Comb. Number Theory*, **9**, 41-46 (2017).
- [43] Q. Wu and W.C. Shiu, $L(j, k)$ -labeling numbers of square of paths, *AKCE Int. J. Graphs Comb.*, **14**, 307-316 (2017).
- [44] J. Li and W.C. Shiu, Unicyclic graphs with a perfect matching having signless Laplacian eigenvalue two, *J. Math. Res. Appl.*, **37**, 379-390 (2017).
- [45] W.C. Shiu, Full edge-friendly index sets of complete bipartite graphs, *Trans. Comb.*, **6(2)**, 7-17 (2017).
- [46] W.C. Shiu, P. Huang, P.K. Sun, The signless Laplacian spectral radius of k -connected irregular graphs, *Linear and Multilinear Algebra*, **65**, 830-839 (2017).
- [47] J. Li, J-M. Guo and W.C. Shiu, The minimum algebraic connectivity of graphs with a given clique number, *Acta Math. Appl. Sin.*, (Chin. Ser.), **39**, 928-937 (2016). (English version: [PDF1170](#))
- [48] D. Chen, W.C. Shiu, Q. Shu, P.K. Sun and W-F. Wang, A characterization of $L(2, 1)$ -labeling number for trees with maximum degree 3, *Acta Math. Sinica*, (Chin. Ser.), **59**, 685-710 (2016). (English version: [PDF1510](#))
- [49] G.C. Lau, W.C. Shiu, H.K. Ng, G.D. Ng and P. Jeyanthi, Further results on SD-prime labeling, *J. Combin. Math. Combin. Comput.*, **98**, 151-170 (2016).
- [50] G.C. Lau, W.C. Shiu and H.K. Ng, Further Results On Super Graceful Labeling of Graphs, *AKCE Int. J. Graphs Comb.*, **13**, 200-209 (2016).
- [51] J-M. Guo, J. Li and W.C. Shiu, Effects on the normalized Laplacian spectral radius of non-bipartite graphs under perturbation and their applications, *Linear and Multilinear Algebra*, **64**, 2177-2187 (2016).
- [52] X. Hu, W-F. Wang, W.C. Shiu and Y. Wang, Plane graphs with maximum degree 9 are entirely 11-choosable, *Discrete Math.*, **339**, 2742-2753 (2016).
- [53] J. Li, Y. Liu and W.C. Shiu, The irregularity of two types of trees, *Discrete Math. and Theor. Comput. Sci.*, **17(3)**, 203-216 (2016).
- [54] J-M. Guo, J. Li and W.C. Shiu, The largest normalized Laplacian spectral radius of non-bipartite graphs, *Bull. Malays. Math. Sci. Soc.*, **39**, S77-S87 (2016). DOI:10.1007/s40840-015-0241-y.
- [55] W.C. Shiu and R.M. Low, The integer-antimagic spectra of dumbbell graphs, *Bull. of ICA*, **77**, 89-110 (2016).

- [56] W.C. Shiu and R.M. Low, Integer-antimagic spectra of complete bipartite graphs and complete bipartite graphs with a deleted edge, *Bull. ICA*, **76**, 54-68 (2016).
- [57] W.C. Shiu, Extreme edge-friendly indices of complete bipartite graphs, *Trans. Comb.*, **5(3)**, 11-21 (2016).
- [58] Q. Wu, W.C. Shiu and P.K. Sun, $L(j, k)$ -labeling number of Cartesian product of path and cycle, *J. Comb. Optim.*, **31**, 604-634 (2016). DOI: 10.1007/s10878-014-9775-4.
- [59] P. Huang, W.C. Shiu and P.K. Sun, Maximizing the spectral radius of k -connected graphs with given diameter, *Linear Algebra Appl.*, **488**, 350-362 (2016).
- [60] W.C. Shiu, P.K. Sun and R.M. Low, The integer-antimagic spectra of tadpole and lollipop graphs, *Congr. Numer.*, **225**, 5-22 (2015).
- [61] W.C. Shiu and G.C. Lau, Some results on k -edge-magic broken wheel graphs, *J. Graph Labeling*, **1**, 65-79 (2015). [PDF1570](#)
- [62] W.C. Shiu, P.C.B. Lam and S-M. Lee, Edge-magic index sets of square of paths, *Util. Math.*, **97**, 271-286 (2015).
- [63] Q. Li, W.C. Shiu and H. Yao, Matching preclusion for cube-connected cycles, *Discrete Appl. Math.*, **190-191**, 118-126 (2015).
- [64] J. Li, J-M. Guo, W.C. Shiu, A note on Randić energy, *MATCH Commun. Math. Comput. Chem.*, **74**, 389-398 (2015).
- [65] D. Chen, W.C. Shiu, Q. Shu, P.K. Sun and W-F. Wang, $(2, 1)$ -Total labeling of trees with large maximum degree, *Discrete Appl. Math.*, **187**, 61-69 (2015).
- [66] R. Liu and W.C. Shiu, General Randić matrix and general Randić incidence matrix, *Discrete Appl. Math.*, **186**, 168-175 (2015).
- [67] R. Liu, W.C. Shiu and J. Xue, Sufficient spectral conditions on Hamiltonian and traceable graphs, *Linear Algebra Appl.*, **467**, 254-266 (2015).
- [68] H. Zhou, W.C. Shiu and P.C.B. Lam, Bounds on $L(2, 1)$ -choice number of Cartesian products of paths and spiders, *J. Comb. Number Theory*, **6(4)**, 219-231 (2014).
- [69] J. Li, J-M. Guo and W.C. Shiu, Bounds on normalized Laplacian eigenvalues of graphs, *J. Inequal. Appl.*, **2014:316** (2014). DOI: 10.1186/1029-242X-2014-316.
- [70] J. Li and W.C. Shiu, The harmonic index of a graph, *Rocky Mountain J. Math.*, **44(5)**, 1607-1620 (2014).
- [71] J. Li and W.C. Shiu, The spectral radii of graphs with prescribed degree sequence, *Kyungpook Math. J.*, **54**, 425-441 (2014).
- [72] H. Zhou, W.C. Shiu and P.C.B. Lam, Notes on $L(1, 1)$ and $L(2, 1)$ labelings for n -cube, *J. Comb. Optim.*, **28**, 626-638 (2014).
- [73] J-B. Lv, J. Li and W.C. Shiu, The harmonic index of unicyclic graphs with given matching number, *Kragujevac J. Math.*, **38**, 173-183 (2014).
- [74] J. Li and W.C. Shiu, The number of spanning trees of composite graphs, *J. Combin. Math. Combin. Comput.*, **89**, 45-52 (2014).

- [75] J. Li, J-M. Guo, W.C. Shiu and A. Chang, Six classes of trees with largest normalized algebraic connectivity, *Linear Algebra Appl.*, **452**, 318-327 (2014).
- [76] J. Li, J-M. Guo, W.C. Shiu and A. Chang, An edge-separating theorem on the second smallest normalized Laplacian eigenvalue of a graph and its applications, *Discrete Appl. Math.*, **171**, 104-115 (2014).
- [77] J. Li, J-M. Guo and W.C. Shiu, The Normalized Laplacian Estrada Index of a Graph, *FILOMAT*, **28**, 365-371 (2014).
- [78] Q. Wu, W.C. Shiu and P.K. Sun, Circular $L(j, k)$ -labeling number of direct product of path and cycle, *J. Comb. Optim.*, **27**, 355-368 (2014).
- [79] W.H. Chan, P.C.B. Lam and W.C. Shiu, Characterization of 3-regular Halin graphs with edge-face total chromatic number equal to four, *Ars Combin.*, **113**, 257-262 (2014).
- [80] J-M. Guo, W.C. Shiu and J. Li, On the Laplacian, signless Laplacian and normalized Laplacian characteristic polynomials of a graph, *Czechoslovak Math. J.*, **63**, 701-720 (2013).
- [81] W.C. Shiu and M.-H. Ho, Full friendly index sets and full product-cordial index sets of some permutation Petersen graphs, *J. Comb. Number Theory*, **5(3)**, 227-244 (2013).
- [82] W.H. Chan, R.M. Low and W.C. Shiu, Group-antimagic labelings of graphs, *Congr. Numer.*, **217**, 21-31 (2013).
- [83] W.C. Shiu and M.-H. Ho, Full friendly index sets of slender and flat cylinder graphs, *Trans. Comb.*, **2(4)**, 63-80 (2013).
- [84] W.C. Shiu and R.M. Low, Group-magic labelings of graphs with deleted edges, *Australas. J. Combin.*, **57**, 3-19 (2013).
- [85] J-M. Guo, J. Li and W.C. Shiu, A note on the upper bounds for the Laplacian spectral radius of graphs, *Linear Alg. Appl.*, **439**, 1657-1661 (2013).
- [86] W.H. Chan, W.C. Shiu, P.K. Sun and X. Zhu, The strong game colouring number of directed graphs, *Discrete Math.*, **313**, 1070-1077 (2013).
- [87] H. Zhang, W.C. Shiu and P.K. Sun, A Relation between Clar Covering Polynomial and Cube Polynomial, *MATCH Commun. Math. Comput. Chem.*, **70**, 477-492 (2013).
- [88] W.C. Shiu and Q. Wu, $L(j, k)$ -number of direct product of path and cycle, *Acta Math. Sin.*, **29**, 1437-1448 (2013).
- [89] W.C. Shiu, Product-cordial index set for Cartesian product of a graph with a path, *J. Comb. Number Theory*, **4(3)**, 177-194 (2012).
- [90] J. Li, J-M. Guo and W.C. Shiu, On the second largest Laplacian eigenvalues of graphs, *Linear Algebra Appl.*, **438**, 2438-2446 (2013).
- [91] J. Li, J-M. Guo and W.C. Shiu, On the spectral radius of unicyclic graphs with fixed girth, *Ars Combin.*, **108**, 65-80 (2013).
- [92] W.C. Shiu and R.M. Low, The integer-magic spectra of bicyclic graphs without pendant, *Congr. Numer.*, **214**, 65-73 (2012).

- [93] W.C. Shiu, The non-edge-magic simple connected cubic graph of order 10, *J. Combin. Math. Combin. Comput.*, **83**, 225-241 (2012).
- [94] W.C. Shiu, H. Chen, X.G. Chen and P.K. Sun, On the total restrained domination number of direct products of graphs, *Discuss. Math. Graph Theory*, **32**, 629-641 (2012).
- [95] H. Zhou, W.C. Shiu and P.C.B. Lam, The $L(2, 1)$ -choosability of cycle, *Trans. Comb.*, **1(3)**, 21-38 (2012).
- [96] P.K. Sun and W.C. Shiu, Some Results on incidence coloring, star arboricity and domination number, *Australas. J. Combin.*, **54**, 107-114 (2012).
- [97] Y. Hou, Z. Tang and W.C. Shiu, Some results on graphs with exactly two main eigenvalues, *Appl. Math. Lett.*, **25**, 1274-1278 (2012).
- [98] J. Li, J-M. Guo and W.C. Shiu, The smallest values of algebraic connectivity for trees, *Acta Math. Sin.*, **28**, 2021-2032 (2012).
- [99] W.C. Shiu, S-M. Lee, Full friendly index sets and full product-cordial index sets of twisted cylinders, *J. Comb. Number Theory*, **3(3)**, 209-216 (2012).
- [100] J-M. Guo, J. Li and W.C. Shiu, The smallest Laplacian spectral radius of graphs with a given clique number, *Linear Algebra Appl.*, **437**, 1109-1122 (2012).
- [101] D-J. Huang, W.C. Shiu and W-F. Wang, On the vertex-arboricity of planar graphs without 7-cycles, *Discrete Math.*, **312**, 2304-2315 (2012).
- [102] W.C. Shiu and H. Kwong, Product-cordial index and friendly index of regular graphs, *Trans. Comb.*, **1(1)**, 15-20 (2012).
- [103] W.C. Shiu and F.S. Wong, Full friendly index sets of cylinder graphs, *Australas. J. Combin.*, **52**, 141-162 (2012).
- [104] W.H. Chan, R.M. Low, W.C. Shiu, J.P. Steinberger and K.Y. Wan, On a switch-setting problem arising from a variation of the lights out game, *JP J. Algebra Number Theory Appl.*, **24**, 173-184 (2012).
- [105] X. Chen and W.C. Shiu, A new upper bound on global defensive alliance number in trees, *Electron. J. Combin.*, **18**, #P202 (2011).
- [106] W.C. Shiu, W.H. Chan, Z.F. Zhang and L. Bian, On the adjacent vertex-distinguishing acyclic edge coloring of graphs, *Appl. Math. J. Chinese Univ.*, **26**, 439-452 (2011).
- [107] C.O. Chow and W.C. Shiu, Counting simsun permutations by descents, *Ann. Comb.*, **15**, 625-635 (2011).
- [108] W.C. Shiu, J-M. Guo and J. Li, The minimum algebraic connectivity of caterpillar unicyclic graphs, *Electron. J. Linear Algebra*, **22**, 838-848 (2011).
- [109] Y. Hou, W.C. Shiu and W.H. Chan, Graphs whose critical groups have larger rank, *Acta Math. Sin.*, **27**, 1663-1670, (2011).
- [110] W.C. Shiu, J. Li and W.H. Chan, A note on the Laplacian Estrada index of a graph, *MATCH Commun. Math. Comput. Chem.*, **66**, 777-784 (2011).

- [111] J. Li, W.C. Shiu and W.H. Chan, On the Laplacian Spectral Radii of Bipartite Graphs, *Linear Algebra Appl.*, **435**, 2183-2192 (2011).
- [112] J-M. Guo, W.C. Shiu and J. Li, The algebraic connectivity of lollipop graphs, *Linear Algebra Appl.*, **434**, 2204-2210 (2011).
- [113] W.C. Shiu and F.S. Wong, Strong vertex-graceful labelings for some double cycles, *Congr. Numer.*, **202**, 17-24 (2010).
- [114] J. Li, J-M. Guo and W.C. Shiu, The orderings of bicyclic graphs and connected graphs by algebraic connectivity, *Electron. J. Combin.*, **17**, #R162, (2010).
- [115] Y. Hou and W.C. Shiu, The spectrum of the edge corona of two graphs, *Electron. J. Linear Algebra*, **20**, 586-594 (2010).
- [116] W.C. Shiu, H. Zhang and S. Liu, Maximal resonance of cubic bipartite polyhedral graphs, *J. Math. Chem.*, **48**, 676-686 (2010).
- [117] W.C. Shiu, X. Chen and W.H. Chan, Some results on matching and total domination in graphs, *Appl. Anal. Discrete Math.*, **4**, 241-252 (2010).
- [118] X. Chen and W.C. Shiu, A note on weakly connected domination number in graphs, *Ars Combin.*, **97**, 193-201 (2010).
- [119] J. Li, W.C. Shiu and A. Chang, The Laplacian spectral radius of graphs, *Czechoslovak Math. J.*, **60** (**135**), 835-847 (2010).
- [120] J. Li, J-M. Guo and W.C. Shiu, The smallest values of algebraic connectivity for unicyclic graphs, *Discrete Appl. Math.*, **158**, 1633-1643 (2010).
- [121] J. Li, W.C. Shiu, W.H. Chan and A. Chang, Ordering trees by their largest Laplacian eigenvalues, *Graph Theory Notes N. Y.*, **LVIII**, 9-18 (2010).
- [122] W.C. Shiu, W. Li, W.H. Chan, On the spectral of the fullerene admitting nontrivial cyclic-5-cutset, *Australas. J. Combin.*, **47**, 41-51 (2010).
- [123] W.C. Shiu and M.H. Ling, Full Friendly Index Sets of Cartesian Products of two Cycles, *Acta Math. Sin.*, **26**, 1233-1244 (2010).
- [124] W.C. Shiu, X.G. Chen and W.H. Chan, Triangle-free graphs with large independent domination number, *Discrete Optim.*, **7**, 86-92 (2010).
- [125] W.C. Shiu, X. Chen and W.H. Chan, Uniformly pair-bonded trees, *Ars Combin.*, **94**, 71-78 (2010).
- [126] J. Li, W.C. Shiu and A. Chang, The number of spanning trees of a graph, *Appl. Math. Lett.*, **23**, 286-290 (2010).
- [127] H. Zhang, D. Ye and W.C. Shiu, Forcing matching number of fullerene graphs, *Appl. Discrete Math.*, **158**, 573-582 (2010).
- [128] J. Li, W.C. Shiu and A. Chang, On the k -th Laplacian Eigenvalues of Trees with Perfect Matchings, *Linear Algebra Appl.*, **432**, 1036-1041 (2010).
- [129] X. Chen and W.C. Shiu, A note on the domination dot-critical graphs, *Discrete Appl. Math.*, **157**, 3743-3745 (2009).

- [130] W.C. Shiu, J. Li and W.H. Chan, Unicyclic and bicyclic graphs of rank 4 or 5, *Congr. Numer.*, **198**, 51-62 (2009).
- [131] W.C. Shiu and F.S. Wong, Extreme Friendly Indices of $C_m \times P_n$, *Congr. Numer.*, **197**, 65-75 (2009).
- [132] W.H. Chan, P.C.B. Lam and W.C. Shiu, Edge-face total chromatic number of Halin graphs, *SIAM J. Discrete Math.* **23**, 1646-1654 (2009).
- [133] P.C.B. Lam, T.M. Wang, W.C. Shiu and G. Gu, On Distance Two Labelling of Unit Interval Graphs, *Taiwanese J. Math.*, **13(4)**, 1167-1179 (2009).
- [134] W.C. Shiu and R.M. Low, \mathbb{Z}_k -magic labelings of fans and wheels with magic-value zero, *Australas. J. Combin.*, **45**, 309-316 (2009).
- [135] W.C. Shiu and H. Kwong, An algebraic approach for finding balance index sets, *Australas. J. Combin.*, **45**, 139-155 (2009).
- [136] J. Li, W.C. Shiu, W.H. Chan and A. Chang, On the spectral radius of graphs with connectivity at most k , *J. Math. Chem.*, **46**, 340-346 (2009).
- [137] W.C. Shiu and L.Z. Zhang, The maximum Randić index of chemical trees with k pendants, *Discrete Math.*, **309**, 4409-4416 (2009).
- [138] J. Li, W.C. Shiu and W.H. Chan, The Laplacian spectral radius of some graphs, *Linear Algebra Appl.*, **431**, 99-103 (2009).
- [139] Z.H. Chen, P.C.B. Lam and W.C. Shiu, Collapsible graphs and reduction of line graphs, *Discrete Math.*, **309**, 3173-3184 (2009).
- [140] J. Li, W.C. Shiu and A. Chang, On the Laplacian Estrada index of a graph, *Appl. Anal. Discrete Math.*, **3**, 147-156 (2009).
- [141] W.C. Shiu and W.K. Tam, The strong chromatic index of complete cubic Halin graphs, *Appl. Math. Lett.*, **22**, 754-758 (2009).
- [142] J. Li, W.C. Shiu and W.H. Chan, Some results on the Laplacian eigenvalues of unicyclic graphs, *Linear Algebra Appl.*, **430**, 2080-2093 (2009). Erratum: From the Editor-in Chief, *Linear Algebra Appl.*, **434**, xviii-xix (2011).
- [143] R.M. Low and W.C. Shiu, On the integer-magic spectra of graphs, *Congr. Numer.*, **191**, 193-203 (2008).
- [144] W.C. Shiu and M.C. Chiu, Invariant factors of Cartesian product of graphs and one point unions of graphs, *Congr. Numer.*, **191**, 173-184 (2008).
- [145] P. You, W.C. Shiu, W.H. Chan and A. Chang, Interchanging graph associated with sorting by transpositions, *Congr. Numer.*, **191**, 25-31 (2008).
- [146] Z. Cao, C.I. Chu and W.C. Shiu, The exponential Diophantine equation $AX^2 + BY^2 = \lambda k^Z$ and its applications, *Taiwanese J. Math.*, **15**, 1015-1034 (2008).
- [147] W.C. Shiu and P.K. Sun, Invalid proofs on incidence coloring, *Discrete Math.*, **308**, 6575-6580 (2008).
- [148] W.C. Shiu, M.H. Ling and R.M. Low, The edge-graceful spectra of connected bicyclic graphs without pendant, *J. Combin. Math. Combin. Comput.*, **66**, 171-185 (2008).

- [149] K.K. Poon and W.C. Shiu, On the Dirichlet's box principle, *Internat. J. Math. Ed. Sci. Tech.*, **39**, 833-838 (2008).
- [150] W.C. Shiu, Extremal Hosoya index and Merrifield-Simmons index of hexagonal spiders, *Discrete Appl. Math.*, **156**, 2978-2985 (2008).
- [151] H. Zhang, P.C.B. Lam and W.C. Shiu, Resonance graphs and a binary coding for the 1-factors of benzenoid systems, *SIAM J. Discrete Math.*, **22**, 971-984 (2008).
- [152] W.C. Shiu, Z. Shao, K.K. Poon and D. Zhang, A new approach to the $L(2, 1)$ -labeling of some product of graphs, *IEEE Trans. Circuits Syst. II*, **55**, 802-805 (2008).
- [153] X. Chen, W.C. Shiu and W.H. Chan, Upper bounds on paired-domination number, *Appl. Math. Lett.*, **21**, 1194-1198 (2008).
- [154] Z. Shao, R.K. Yeh, K.K. Poon and W.C. Shiu, The $L(2, 1)$ -labeling of $K_{1,n}$ -free graphs and its applications, *Appl. Math. Lett.*, **21**, 1188-1193 (2008).
- [155] Z. Shao, S. Klavar, W.C. Shiu and D. Zhang, Improved bounds on the $L(2, 1)$ -number of direct and strong products of graphs, *IEEE Trans. Circuits Syst. II*, **55**, 685-689 (2008).
- [156] W.C. Shiu and G. Liu, k -factors in regular graphs, *Acta Math. Sin.*, **24**, 1213-1220 (2008).
- [157] X. Chen, W.C. Shiu and H. Chen, Trees with equal total domination and total restrained domination numbers, *Discuss. Math. Graph Theory*, **28**, 59-66 (2008).
- [158] W.C. Shiu and Harris Kwong, Full friendly index sets of $P_2 \times P_n$, *Discrete Math.*, **308**, 3688-3693 (2008).
- [159] J. Li, A. Chang and W.C. Shiu, On the nullity of bicyclic graphs, *MATCH Commun. Math. Comput. Chem.*, **60**, 21-36 (2008).
- [160] W.C. Shiu and R.M. Low, Ring-magic labelings of graphs, *Australas. J. of Combin.*, **41**, 147-158 (2008).
- [161] W.H. Chan, P.C.B. Lam and W.C. Shiu, Cyclic bandwidth with an edge added, *Discrete Appl. Math.*, **156**, 131-137 (2008).
- [162] W.C. Shiu and L.Z. Zhang, Pancyclism of 3-domination-critical graphs with small minimum degree, *Util. Math.*, **75**, 175-192 (2008).
- [163] W.C. Shiu and H. Zhang, A complete characterization for k -resonant Klein-bottle polyhexes, *J. Math. Chem.*, **43**, 45-59 (2008).
- [164] A. Chang and W.C. Shiu, On the k -th eigenvalues of trees with perfect matchings, *Discrete Math. Theor. Comput. Sci.*, **9** 321-332 (2007).
- [165] W.C. Shiu and M.H. Ling, Extreme friendly indices of $C_m \times C_n$, *Congr. Numer.*, **188**, 175-182 (2007).
- [166] W.C. Shiu, Edge-magic labeling matrices of the composition of paths with null graphs, *Congr. Numer.*, **187**, 55-69 (2007).
- [167] W.C. Shiu and R.W. Low, Integer-magic spectra of sun graphs, *J. Comb. Optim.*, **14**, 309-321 (2007).
- [168] Z.H. Chen, H.J. Lai, W.C. Shiu and D Li, An s -Hamiltonian line graph problem, *Graphs Combin.*, **23**, 241-248 (2007).

- [169] X. Dong, W.C. Shiu, C.I. Chu and Z. Cao, The simultaneous Pell equation $y^2 - Dz^2 = 1$ and $x^2 - 2Dz^2 = 1$, *Acta Arith.*, **162**, 115-123 (2007).
- [170] W. Lin, P.C.B. Lam, and W.C. Shiu, Circular chromatic numbers of the generalized Mycielskians of cycles, *J. Nanjing Univ. Math. Biquarterly*, **23**, 232-241 (2006).
- [171] W.C. Shiu and C.I. Chu, Frequency of Fibonacci numbers in modulo 3^k that are congruent to 8 (mod 27), *Int. J. Pure Appl. Math.*, **33**, 7-21 (2006).
- [172] W.C. Shiu and C.I. Chu, The number of increasing nonconsecutive subpaths in a path, *Graph Theory Notes N. Y.*, **LI**, 47-49 (2006).
- [173] W.C. Shiu, M.H. Ling and R.M. Low, The entire edge-graceful spectra of cycles with one chord, *Congr. Numer.*, **183**, 213-219 (2006).
- [174] P.C.B. Lam, W.C. Shiu and G. Gu, Graphs with convex labelings, *Congr. Numer.*, **183**, 33-50 (2006).
- [175] W.C. Shiu, P.C.B. Lam and P.K. Sun, Cubic graphs with different incidence chromatic numbers, *Congr. Numer.*, **182**, 33-40 (2006).
- [176] W.C. Shiu, Super-edge-graceful labelings of some cubic graphs, *Acta Math. Sin.*, **22(6)**, 1621-1628 (2006). [PDF0410](#)
- [177] W.C. Shiu and R.M. Low, Group magicness of complete N -partite graph, *J. Combin. Math. Combin. Comput.*, **58**, 129-134 (2006). [PDF0481](#)
- [178] W.C. Shiu, P.C.B. Lam and W.K. Tam, On strong chromatic index of Halin graph, *J. Combin. Math. Combin. Comput.*, **57**, 211-222 (2006). [PDF0323](#)
- [179] A. Chen, A. Chang and W.C. Shiu, Energy ordering of unicycle graphs, *MATCH Commun. Math. Comput. Chem.*, **55**, 95-102 (2006).
- [180] W.C. Shiu and P.C.B. Lam, Super-edge-graceful labelings of multi-level wheel graphs, fan graphs and actinia graphs, *Congr. Numer.*, **174**, 49-63 (2005). [PDF0540](#)
- [181] W.C. Shiu, P.C.B. Lam and H. Zhang, k -resonance in toroidal polyhexes, *J. Math. Chem.*, **38**, 451-466 (2005). [PDF04K0](#)
- [182] W.C. Shiu, A software for editing mathematics in Chinese – PUTE_X, *Datum*, **42**, 29-31 (2005).
- [183] K.K. Poon, K.W. Yeung and W.C. Shiu, On the decimal numbers base n , *Internat. J. Math. Ed. Sci. Tech.*, **36**, 601-605 (2005).
- [184] W.C. Shiu and C.I. Chu, Distribution of the Fibonacci number modulo 3^k , *Fibonacci Quart.*, **43**, 22-28 (2005). [PDF0130](#)
- [185] P.C.B. Lam, W.C. Shiu and Z.M. Song, The 3-choosability of plane graphs of girth 4, *Discrete Math.*, **294**, 297-301 (2005).
- [186] W.C. Shiu, P.C.B. Lam and P.K. Sun, Construction of group-magic graphs and some A -magic graphs with A of even order, *Congr. Numer.*, **167**, 97-107 (2004). [PDF0432](#)
- [187] W.C. Shiu, Invariant factors of graphs associated with hyperplane arrangements, *Discrete Math.*, **288**, 135-148 (2004). [PDF9810](#)
- [188] K.K. Poon and W.C. Shiu, Sperner Lemma and its applications, *Mathmedia*, **27(4)**, 42-49 (2003). [PDF025C](#)

- [189] H. Zhang, P.C.B. Lam and W.C. Shiu, Cell rotation graphs of strongly connected orientations of plane graphs with application, *Discrete Appl. Math.*, **130**, 469-485 (2003). [PDF0260](#)
- [190] D. Kremer and W.C. Shiu, Finite transition matrices for permutations avoiding pairs of length four patterns, *Discrete Math.*, **268**, 171-183 (2003).
- [191] P.C.B. Lam, W.C. Shiu and H. Zhang, Elementary block of plane bipartite graphs, *MATCH Commun. Math. Comput. Chem.*, **49**, 127-137 (2003). [PDF0240](#)
- [192] W.C. Shiu, P.C.B. Lam and L.Z. Zhang, Fully angular hexagonal chains extremal with regard to the largest eigenvalue, *Indian J. Chem.*, **42A**, 1298-1303 (June, 2003). [PDF0281](#)
- [193] W.C. Shiu, P.C.B. Lam and Y. Li, On some three-color Ramsey numbers, *Graphs Combin.*, **19**, 249-258 (2003). [PDF9925](#)
- [194] W.C. Shiu, P.C.B. Lam and L.Z. Zhang, Extremal k^* -cycle resonant hexagonal chains, *J. Math. Chem.*, **33**, 17-28 (2003). [PDF0150](#)
- [195] W.C. Shiu, P.C.B. Lam and H. Zhang, Clar and sextet polynomials of buckminsterfullerene, *J. Molecular Structure: THEOCHEM*, **622**, 239-248 (2003). [PDF0210](#)
- [196] W.C. Shiu and P.C.B. Lam, More on the generalized Fibonacci numbers and associated bipartite graphs, *Internat. Math J.*, **3(1)**, 5-9 (2003). [PDF0101](#)
- [197] W.C. Shiu, P.C.B. Lam and Y. Li, On generalized Ramsey numbers, *Discrete Math.*, **258**, 383-388 (2002). [PDF0020](#)
- [198] W.C. Shiu, P.C.B. Lam, F. Zhang and H. Zhang, Normal components, Kekulé patterns, and Clar patterns in plane bipartite graph, *J. Math. Chem.*, **31(4)**, 405-420 (2002). [PDF0230](#)
- [199] W.C. Shiu, P.C.B. Lam and S-M. Lee, On a construction of supermagic graphs, *J. Combin. Math. Combin. Comput.*, **42**, 147-160 (2002). [PDF0040](#)
- [200] W.C. Shiu, P.C.B. Lam and S-M Lee, Edge-magic indices of $(n, n-1)$ -graphs, *Electron. Notes Discrete Math.*, **11** (July, 2002). [PDF9815](#)
- [201] W.C. Shiu, P.C.B. Lam and H.L. Cheng, Edge-gracefulness of the composition paths with null graphs, *Discrete Math.*, **253**, 63-76 (2002). [PDF0015](#)
- [202] W.C. Shiu, P.C.B. Lam and D.L. Chen, On incidence coloring for some cubic graphs, *Discrete Math.*, **252**, 259-266 (2002).
- [203] W.C. Shiu, P.C.B. Lam and K.K. Poon, On Wiener numbers of polygonal nets, *Discrete Appl. Math.*, **122**, 251-261 (2002). [PDF0060](#)
- [204] W.C. Shiu and S-M. Lee, Some edge-magic cubic graphs, *J. Combin. Math. Combin. Comput.*, **40**, 115-127 (2002). [PDF9825](#)
- [205] P.C.B. Lam, W.C. Shiu and W.H. Chan, Characterization of graphs with equal bandwidth and cyclic bandwidth, *Discrete Math.*, **242**, 283-289 (2002). [PDF9919](#)
- [206] W.C. Shiu, P.C.B. Lam, D-L. Chen and L-Y. Miao, On the ℓ -distance face coloring of regular plane graphs, *Congr. Numer.*, **152**, 85-88 (2001). [PDF0105](#)
- [207] P.C.B. Lam, J. Liu, W.C. Shiu and Z.M. Song, A class of graph with χ^* close to $\chi-1$, *Congr. Numer.*, **150**, 65-68 (2001).

- [208] P.C.B. Lam, W.C. Shiu, C.S. Tong and Z.F. Zhang, On the equitable chromatic number of complete n -partite graphs, *Discrete Appl. Math.*, **113**, 307-310 (2001). [PDF9605](#)
- [209] W.C. Shiu, S-M. Lee and K. Schaffer, Some k -fold edge-graceful labelings of $(p, p - 1)$ -graphs, *J. Combin. Math. Combin. Comput.*, **38**, 81-95 (2001). [PDF9830](#)
- [210] P.C.B. Lam, W.C. Shiu and B. Xu, On structure of some plane graphs with application to choosability, *J. Combin. Theory, Ser. B*, **82**, 285-296 (2001).
- [211] P.C.B. Lam, W.C. Shiu, F. Sun, J.F. Wang and G. Yan, Linear vertex arboricity, independence number and clique cover number, *Ars Combin.*, **58**, 121-128 (2001). [PDF9710](#)
- [212] W.C. Shiu, P.C.B. Lam and H.L. Cheng, Supermagic labeling of an s -duplicate of $K_{n,n}$, *Congr. Numer.*, **146**, 119-124 (2000). [PDF0010](#)
- [213] P.C.B. Lam, W.C. Shiu and W.H. Chan, Edge-face total chromatic number of 3-regular Halin graph, *Congr. Numer.*, **145**, 161-165 (2000). [PDF0030](#)
- [214] M.H.F. Chu and W.C. Shiu, Theoretical studies of AlGaAs-GaAs multiple-quantum-well single channel waveguide defined by ion-implantation-induced intermixing, *Proceedings of SPIE*, **3944**, 149-163 (2000).
- [215] B.L. Weiss, Y. Chan, W.C. Shiu and E.H. Li, The electro-optic properties of interdiffused InGaAs/InP quantum well structures, *J. Appl. Phys.*, **88** (6), 3418-3425 (2000).
- [216] P.C.B. Lam, G. Liu, G. Li and W.C. Shiu, Orthogonal (g, f) -factorization in networks, *Network*, **35** (4), 274-278 (2000). [PDF9917](#)
- [217] P.C.B. Lam, W.C. Shiu and H.L. Cheng, Knight's tour on hexagonal nets, *Congr. Numer.*, **141**, 73-82 (1999).
- [218] W.C. Shiu, P.C.B. Lam and S-M Lee, Edge-magic index set of (p, p) -graphs, *Congr. Numer.*, **137**, 97-107 (1999). [PDF9901](#)
- [219] P.C.B. Lam, J. Liu, W.C. Shiu and J. Wu, Some sufficient conditions for a planar graph to be class 1, *Congr. Numer.*, **136**, 201-205 (1999). [PDF9904](#)
- [220] P.C.B. Lam, W.C. Shiu and B. Xu, Edge game coloring of graphs, *Graph Theory Notes N. Y.*, **XXXVII:3**, 17-19 (1999). [PDF9807](#)
- [221] K.F. Fang, W.C. Shiu and J.X. Pan, Uniform designs based on Latin squares, *Stat. Sinica*, **9**, No. **3**, 905-912 (1999).
- [222] P.C.B. Lam, W.C. Shiu and L. Sun, On independent domination number of regular graphs, *Discrete Math.*, **202**, 135-144 (1999). [PDF9702](#)
- [223] W.C. Shiu, P.C.B. Lam and Z. Zhang, Entire chromatic number of maximal outerplanar graphs with maximum degree at most 4, *Proc. 8th Quadrennial Internat. Conf. on Graph Theory, Combin., Algor. and Appl.*, Vol. **II**, 591-595 (1999).
- [224] W.C. Shiu, P.C.B. Lam and S-M. Lee, Edge-magicness of the composition of a cycle with a null graph, *Congr. Numer.*, **132**, 9-18 (1998). [PDF9703](#)
- [225] J. Micallef, A. Brincat and W.C. Shiu, Effects of interdiffusion-induces strain in $\text{Ga}_{0.51}\text{In}_{0.49}\text{P}$ —GaAs intermixed quantum wells, *IEEE J. Selected Topics in Quantum Electronics*, **4** No. **4**, 675-684 (1998).

- [226] J. Micallef, A. Brincat and W.C. Shiu, Cation interdiffusion in GaInP/GaAs single quantum wells, *Materials Research Society Symp. Proceeding*, **484**, 441-446 (1998).
- [227] W.C. Shiu and P.C.B. Lam, Wiener numbers of some pericondensed benzenoid molecule systems, *Congr. Numer.*, **126**, 113-124 (1997).
- [228] P.C.B. Lam, W.C. Shiu and Y.X. Lam, Duality in the bandwidth problem, *Congr. Numer.*, **124**, 117-127 (1997). [PDF9520](#)
- [229] W.C. Shiu, P.C.B. Lam and I. Gutman, Wiener number of hexagonal bitrapeziums and trapeziums, *Bull. Acad. Serbe Sci. Arts (Cl. Sci. Math. Natur.)*, **114**, 9-25 (1997).
- [230] P.C.B. Lam, W.C. Shiu and W.H. Chan, On bandwidth and cyclic bandwidth of graphs, *Ars Combin.*, **47**, 147-152 (1997). [PDF9610](#)
- [231] W.C. Shiu and Y.P. Tang, Existence of ideal matrices, *Ars Combin.*, **47**, 87-92 (1997). [PDF9620](#)
- [232] W.C. Shiu, Decoding de Bruijn arrays constructed by FFMS method, *Ars Combin.*, **47**, 33-48 (1997).
- [233] W.C. Shiu, C.S. Tong and P.C.B. Lam, Wiener number of hexagonal jagged-rectangles, *Discrete Appl. Math.*, **80**, 83-96 (1997).
- [234] P.C.B. Lam, W.C. Shiu, W.H. Chan and Y.X. Lin, On the bandwidth of convex triangulation meshes, *Discrete Math.*, **173**, 285-289 (1997).
- [235] W.C. Shiu and P.C.B. Lam, The Wiener number of hexagonal net, *Discrete Appl. Math.*, **73**, 101-111 (1997).
- [236] Y. Chan, W.C. Shiu, W.K. Tsui and E.H. Li, Multiple cations interdiffusion in $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}/\text{In}_{0.52}\text{Al}_{0.48}\text{As}$ quantum well, *Materials Research Society Symp. Preceeding*, **450**, 377-382 (1997).
- [237] J. Micallef, J.L. Borg and W.C. Shiu, Polarization insensitivity in interdiffused, strained InGaAs/InP quantum wells, *Materials Research Society Symp. Proceeding*, **450**, 371-376 (1997).
- [238] W.C. Shiu, C.S. Tong and P.C.B. Lam, Wiener number of some polycyclic graphs, *Graph Theory Notes N. Y.*, **XXXII:2**, 10-15 (1997).
- [239] I. Gutman, G. Dömötör, P.C.B. Lam, W.C. Shiu and L. Popvoić, Szeged indices of benzenoid hydrocarbons, *Polycyclic Aromatic Compounds*, **8**, 259-270 (1996).
- [240] W.K. Tsui, E.H. Li, W.C. Shiu and Y. Chan, Three species interdiffusion and their effect on the variation of strains in $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}/\text{In}_{0.52}\text{Al}_{0.48}\text{As}$ QW, *Third Chinese Optoelectronics Workshop*, Changchun, 266-267 (1996).
- [241] W.C. Shiu, P.C. Lam and I. Gutman, Wiener number of hexagonal parallelograms, *Graph Theory Notes N. Y.*, **XXX:6**, 21-25 (1996).
- [242] W.C. Shiu, Difference sets in groups containing subgroups of index 2, *Ars Combin.*, **42**, 199-205 (1996). [PDF9510](#)
- [243] E.H. Li, J. Micallef and W.C. Shiu, The optical properties of InGaAs(P)/InP under group V sublattice two-phase interdiffusion, *Materials Research Society Symp. Proceeding*, **417**, 289-293 (1996).
- [244] W.C. Shiu, S.L. Ma and K.T. Fang, On the rank of cyclic Latin squares, *Linear Multilinear Algebra*, **40**, 183-188 (1995).

- [245] W.C. Shiu, Correction to algebraic structure of Schur rings, *Chin. J. Math. (R.O.C.)*, **23**, 193-194 (1995). [PDF1995](#)
- [246] W.C. Shiu, J. Micallef, I. Ng, and E.H. Li, Effects of different cation and anion interdiffusion rates in disordered $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}/\text{InP}$ single quantum wells, *Japanese J. Appl. Phys.*, **34**, part 1, No. 4A, 1778-1783 (1995).
- [247] W.C. Shiu, Algebraic structure of Schur rings, *Chin. J. Math. (R.O.C.)*, **21**, 55-71 (1993). [PDF1993](#)
- [248] W.C. Shiu, Schur rings over dihedral groups, *Chin. J. Math. (R.O.C.)*, **18**, 209-223 (1990). [PDF1990](#)