# The Study for Ring Embedding in Faulty Generalized Pancake Networks


## 賴盈志、洪春男

E-mail: 9314764@mail.dyu.edu.tw



**ABSTRACT**

In this thesis, we study the fault-tolerant properties for n-dimensional 2-sided pancake graphs(2Pn).We obtain that when |F| (n - 2),2Pn - F are Hamiltonian graphs, and when|F| (n - 3), 2Pn - F are Hamiltonian connected graphs with n ≡ 3,F ?(V(2Pn)∪ E(2Pn)). We also investigate the fault-tolerant properties for n-dimensional m-sided pancake graphs (mPn). Assume the graphs mP2 are 2-Hamiltonian and 1-Hamiltonian connected, when |F| (2n - 2), mPn-F are Hamiltonian graphs, and when |F| (2n - 3),mPn-F are Hamiltonian connected graphs with n ≡ 3,m ≡ 3,F?(V(mPn)∪ E(mPn)).



Keywords : pancake graphs, fault-tolerant embedding, Hamiltonian path, Hamiltonian cycle, Hamiltonian connected graph.


**Table of Contents**



**REFERENCES**


[1] R. Balakrishnan, K. Ranganathan,“ A TEXTBOOK OF GRAPH THEORY ”, ISBN 0-387-98859-9 Springer-Verlag New York Berlin Heidelberg SPIN 10727816, 1991 [2] A. Bouabdallah, M.C. Heydemann, J. Opatrny, D. Sotteau,“ Embedding complete binary trees into star and pancake graphs ”, Theory of Computing Systems, pp.279 – 305, 1998.

[3] W.C. Fang, C.C. Hsu,“ On the fault-tolerant embedding of complete binary tree in the pancake graph interconnection network ”, Information Science, pp.191 – 204, 2000.

[4] L. Gargano, U. Vaccaro, A. Vozella,“ Fault tolerant routing in the star and pancake interconnection networks ”, Information Processing Letters, pp.315 – 320, 1993.

[5] F. Harary and J. P. Hayes, ”Edge fault tolerance in graphs ”, Networks 23 pp.135-142, 1993.

[6] F. Haray and J. P. Hayes,“ Node fault tolerance in graphs ”, Networks 27 pp.19-23, 1996.

[7] M.H. Heydari, I.H. Sudborough,“ On the diameter of the pancake network ”, J. Algorithms, pp.67 – 94, 1997.

[8] S. Y. Hsieh, G. H. Chen, and C. W. Ho, "Fault-Free Hamiltonian Cycles in Faulty Arrangement Graphs", IEEE Transactions on Parallel and Distributed Systems, Vol.10, no.3, pp. 223-237, 1999.

[9] S. Y. Hsieh, G. H. Chen and C. W. Ho,“ Hamiltonian-laceability of star graphs ”, Networks, Vol.36(4), pp.225-232, 2000.

[10] S. Y. Hsieh, G. H. Chen and C. W. Ho,“ Longest fault-free paths in star graphs with vertex faults ”, Theoretical Computer Science, Vol.262, pp.215-227, 2001.

[11] W. T. Huang, Y. C. Chuang, L. H. Hsu, and J. M. Tan,“ On the Fault-Tolerant Hamiltonicity of Crossed Cubes ”, National Computer Symposium, pp.411-416, 1999.

[12] W. T. Huang, Y. C. Chuang, L. H. Hsu, and J. M. Tan,“ Fault-Free Hamiltonian Cycle in Faulty Mobius Cube ”, J. Computing and System, pp.406-114, 2000.

[13] W. T. Huang, J. M. Tan, C. N. Hung, and L. H. Hsu,“ Fault-Tolerant Hamiltonicity of Twisted Cubes ”, Journal of Parallel and Distributed Computing, 2000.

[14] C. N. Hung, L. H. Hsu, and T. Y. Sung,“ Christmas tree: a versatile 1-fault-tolerant design for token rings ”, Information Processing Letters, Vol.72, pp.55-63, 1999.

[15] C. N. Hung, L. H. Hsu, and T. Y. Sung,“ On the construction of combined k-fault-tolerant Hamiltonian graphs ”, Networks, Vol. 37(3),

pp.165-170, 2001.
[16] C. N. Hung, H. C. Hsu, K. Y. Liang, and L. H. Hsu, “ Ring embedding in faulty pancake graphs ”, Information Processing Letters, Vol.86, pp.271 – 275, 2003 [17] C. N. Hung, K. Y. Liang, and L.H. Hsu, “ Embedding Hamiltonian paths and Hamiltonian cycles in faulty Pancake graphs ”, International Symposium on Parallel Architectures, Algorithms and Networks, pp.179-184, 2002.
[18] C. N. Hung, “ Optimal k-Fault-Tolerant Networks for Token rings ”, Ph. D. Thesis, Institute of Computer and Information Science, National Chiao Tung University, Hsinchu, Taiwan, Republe of China, 1999.
[19] Marissa P. Justan, Felix P. Muga II, Ivan Hal Sudborough, “ On the Generalization of the Pancake Network ”, Proceedings of the International Symposium on Parallel Architectures, Algorithms and Networks, pp.173-178, 2002 [20] A. Kanevsky, and C. Feng, “ On the embedding of cycles in pancake graphs ”, Parallel Computing, Vol.21, pp.923-936, 1995.
[21] J. S. Kim, S. R. Maeng, and H. Yoon, “ Embedding of rings in 2-D meshes and tori with faulty nodes ”, Journal of Systems Architecture, Vol.43, pp.643-654, 1997.
[22] R. S. Lo and G. H. Chen, “ Embedding Hamiltonian Paths in Faulty Arrangement Graphs with the Backtracking Method ”, IEEE Trans. On parallel and Distributed Systems, Vol.12, no.2, pp.202-222, 2001.
[23] K. Mukhopadhyaya and B. P. Sinha, “ Hamiltonian graphs with minimum number of edges for fault-tolerant topologies ”, Information Processing Letters, Vol.44, pp.95-99, 1992.
[24] O. Ore, “ Hamiltonian connected graph ”, J. Math. Pures Appli, Vol.42, pp.121-127, 1963.
[25] C. H. Tsai, J. M. Tan, Y.C. Chuang, and L. H. Hsu, “ Fault-free cycles and Links in faulty recursive circulant graphs ”, proceedings of the ICS2000 Workshop on algorithms and Theory of Computation, pp.74-77, 2000.
[26] Y. C. Tseng, S. H. Chang and J. P. Sheu, “ Fault-tolerant ring embedding in a star graph with both link and node failures ”, IEEE Trans. Parallel Distributed. Systems Vol.8, pp.1185-1195, 1997.
[27] J. J. Wang, C. N. Hung, and L. H. Hsu, “ Optimal 1-Hamiltonain graphs ”, Information Processing Letters, Vol.65, pp.157-161, 1998.
[28] J. J. Wang, C. N. Hung, Jimmy J. M. Tan, L. H. Hsu, and T. Y. Sung, “ Construction schemes for fault-tolerant Hamiltonian graphs ”, Networks, Vol.35, pp.233-245, 2000.
[29] 賴盈志, 洪春男, “ Generalized pancake graphs 的漢米爾頓容錯 性質 ”, 第二十一屆組合數學與計算理論研討會論文集, pp.153-164, 2004.