Design and fabrication of piezoelectric fan

鄧裕慶、鄭江河

E-mail: 319788@mail.dyu.edu.tw

ABSTRACT

Piezoelectric fan is a new concept of miniature devices, compared to traditional fans, there are three advantages: small volume, less power consumption and noise-reduction; in other words, these advantages are quite applicable in these electronic products. This article focuses on the design and fabrication different types of piezoelectric fans, the driving voltage, driving frequency of the piezoelectric fan's wind velocity and tip displacement, to find out the maximum wind speed and the best cooling design. Piezoelectric fan consists of three basic components: the piezoelectric patch, blade and Metal Substrate, and between the three structures by the appropriate adhesive bonding. Focus on using experimental measurement set up anemometer and heated to test different modules fans caused by wind velocity and cooling capacity. The results showed the critical impact of wind velocity is frequency; cooling capacity increases with wind velocity.

Keywords : Piezoelectric fan、Blade、Cooling、Resonance frequency

Table of Contents

REFERENCES

[1]M. Toda, S. Osaka, “ Vibrational fan using the piezoelectric polymer PVF2, ” Proceedings of the IEEE, vol.67, pp.1171-1173, 1979.

[2]Yoo, J. H., Hong, J. I., and Park, C.Y., ” Characteristics of Piezoelectric Fails using PZT Ceramics ” Proceedmgs of the 5th International Conference on Properties and Applications of Dielectric Materials , May 25-30, 1997, Seoul.

[3]Yoo, J. H., Hong, J. I., and Cao, W., “ Piezoelectric Ceramic Bimorph Coupled to Thin Metal Plate Fan as Cooling Fan for Electronic devices, ” Sensors and Actuators A, vol. 79, pp. 8-12, 2000.

[4]Sydney M. Wait, Sudipta Basak, Suresh V. Garimella, and Arvind Raman, “ Piezoelectric Fans Using Higher Flexural Modes for Electronics Cooling Applications, ” IEEE Transaction on Components and Packaging Technologies, vol.30, pp. 119-128, 2007.

[5]Schmidt, R. R., “ Local and Average Transfer Coefficients on a Vertical Surface Due to Convection form a Piezoelectric Fan, ” InterSociety Conference on Thermal Phenomena, pp. 41-49, Washing DC, May4-7, 1994.

[6]Burmann, P., Raman, A., and Garimella, S. V., “ Dynamics and Topology Optimization of Piezoelectric Fans, ” IEEE Transactions on Components and Packaging Technologies, vol. 25, pp. 592-600, 2002.

[7]Acikalin, T., Garimella, S. V., Petroski, J., and Raman, A., “ Optimal Design of Miniature Piezoelectric Fans for Cooling Light Emitting Diodes, ” IEEE Thermal and Thermomechanical Phenomena in Electronics System, pp.663-671, 2004 [8]Acikalin, T., Wait, S., Garimella, S. V., and Raman, A., “ Experimental Investigation of the Thermal Performance of Piezoelectric Fans, ” Heat Transfer Engineering, vol. 25, pp. 4-14, 2004.

[9] http://www.piezo.com