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D. Xie, Y.G. Wang, J.H. Cheng

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Length dependence of the resonant magnetoelectric effect in Ni/ $Pb(Zr,Ti)O_3$/Ni long cylindrical composites

D. Xie, Y. G. Wang[1], J. H. Cheng

College of Materials Science and Technology, Nanjing University of Aeronautics and Astronautics, Nanjing 210016, People's Republic of China

Abstract

Magnetoelectric (ME) effect was studied in the long cylindrical Ni/ $Pb(Zr,Ti)O_3$/Ni layered composites prepared by electroless deposition. Three significant resonant peaks have been observed in the dependence of the ME voltage coefficient on the magnetic field frequency. The height of the composite cylinder has an important impact on the ME effect. With the height of the cylinder increase, the value of ME coefficient at static or low-frequency case increases, while the resonant frequencies decrease. Furthermore, the ME effect at the individual resonant frequencies can be weaken or enhance due to the coupling of radial and axial vibration modes. The experimental values of resonant frequencies are in good agreement with the calculated ones. The results are useful for magnetoelectric devices with controllable multifrequency operation.

Keywords: Magnetoelectric; Cylindrical composite; Resonant frequency; Height

[1] Corresponding author. *Fax*: +86 (0)25 5211 2626; *E-mail*: yingang.wang@nuaa.edu.cn