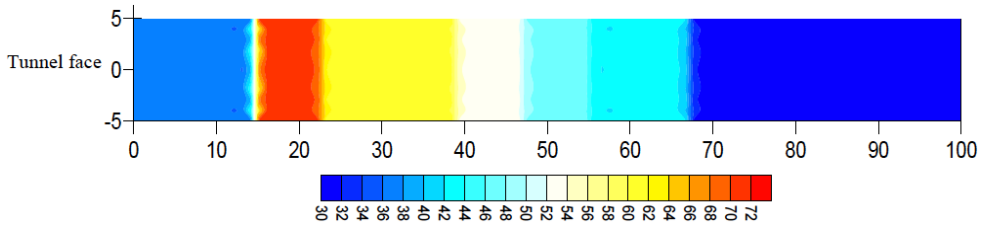

Fig. (6). Fusion image of MSP, MRP and MTEM.

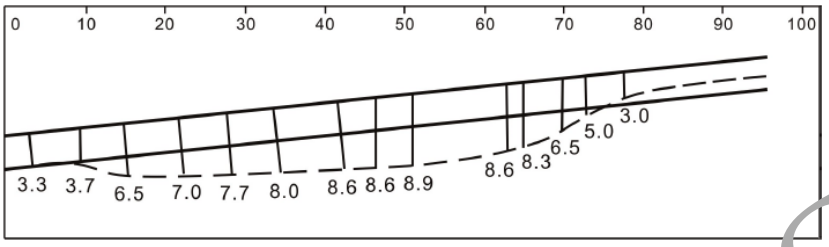

Fig. (7). Measured profile of coal seam thickness.

The energy abnormity signal of MSP was processed by wavelet analysis. Minimal value of low-frequency and maximum value of high-frequency were united to ascertain the seismic interfaces. The comprehensive apparent resistivity profile of MRP and MTEM and the seismic interfaces were associated to form the fusion image. The image agrees with the fact, which indicates the coal seam thickness can be forecasted by advanced prediction method of joint inversion in mine roadway.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

ACKNOWLEDGEMENTS

This research was supported by the Joint Funding Project of National Natural Science Foundation and ShenHua Group Corporation Ltd (U1261202), National Natural Science Foundation Project (51174193, 51374203, 51323004, 41474122).

REFERENCES

[1] S.Z. Shi, F.B. Li, P. Liang, and Y. Li, "Application of multi-well constrained seismic inversion in quantitative prediction of coal seam thickness", *Journal of Mining and safety engineering*, vol. 28, pp. 328-332, June 2011.

[2] Y. Chen, and G.B. Yin, "Impact of thrust nappe structure on coal seam thickness and its stability in Fufeng of Huainan", *China Coal*, vol. 39, pp. 38-41, 2013.

[3] J.C. Pashin, "Variable gas saturation in combed methane reservoirs of the Black Warrior Basin: implications for exploration and production", *International Journal of Coal Geology*, vol. 82, pp. 135-146, 2010.

[4] S.P. Peng, G.G. ZOU, and Q.L. LI, "Seam thickness prediction methods based on the logging constrained seismic inversion", *Journal of China University of Mining and Technology*, vol. 37, pp. 729-733, November 2008.

[5] Z. Yang, M.T. Ge, and S.G. Wang, "Characteristics of transmitting channel wave in a coal seam", *Mining Science and Technology*, vol. 19, pp. 331-336, 2009.

[6] Y.M. Du, and C.G. Zhang, "Study of Advance Detection of Coal Seam Thickness based on Integrate Geophysical Prospecting Techniques", *Mining Safety and Environment Protection*, vol. 40, pp. 63-66, 2013.

[7] Z.Y. Liu, Z.H. Yue, and Y.G. Liu, "Application of sector detection technology in advanced derection", *Journal of China University of Mining and Technology*, vol. 36, pp. 822-825, 2007.

[8] P.S. Zhang, S.D. Liu, and P.G. Li, "Mine transient electromagnetic technology system and its application", *Progress in Geophysics*, vol. 26, pp. 1107-1114, 2011.

[9] S.H. Zhou, J.C. Yu, and J.H. Chang, "Study of mine transient electromagnetic response characteristics and correction method under support using bolt and wire mesh", *Mining Safety and Environment Protection*, vol. 41, pp. 17-19, June 2014.

[10] M. Roth, and K. Holliger, "Joint inversion of Rayleigh and guided waves in high-resolution seismic data using agenetic algorithm". In: *Annual Meeting Abstracts, Society of Exploration Geophysicists*, pp. 1570-1573, 1998.

[11] R.Z. Jing, G.S. Bao, J. Lin, and S.Q. Chen, "A geophysical integration inversion method based on data fusion", *Chinese Journal of Geophysics*, vol. 47, pp. 143- 150, May 2004.

[12] S.P. Sharma, "Appraisal of equivalence and suppression problems in 1D EM and DC measurements using global optimization and joint inversion", *Geophysical prospecting*, vol. 47, pp. 219-249, March 1999.

[13] R. Chunduru, Z. Zhang, R. Busch, and T. Maher, "Joint inversion of MWD and wire line measurements". In: *Annual Meeting Abstracts, Society of Exploration Geophysicists*, pp. 132-135, 1999.

[14] M. Peng, H.D. Tan, and M. Jiang, "Three-dimensional joint inversion of magnetotenuric and seismic travel time data with cross-gradient constraints", *Chinese Journal of Geophysics*, vol. 56, pp. 2728-2738, August 2013.

[15] J.L. Cheng, Y.H. Wang, and S.J. Yu, "The principle and application of advance surveying in roadway excavation by resistivity method", *Coal Geology and Exploration*, vol. 28, pp. 60-62, August 2000.

Received: December 15, 2014 Revised: January 04, 2015 Accepted: February 25, 2015

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