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Sound focused personal Audio system design: performance improvement in acoustic contrast control by spatial weighting for obtaining spatially averaged acoustic potential energy

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In acoustic contrast control[J.-W. Choi and Y.-H. Kim, J. Acoust. Soc. Am. 111. 1695(2002)], spatially averaged acoustic potential energy is used as a representative spatial parameter because acoustic contrast control aims to maximize spatially averaged acoustic potential energy ratio between acoustically bright and dark zone. Therefore, spatial averaging process should be concerned carefully because control performance is sensitive to how to determine bright and dark zone. We have already got successful result in feasibility study for personal audio system with over 20dB difference between bright(frontal) and dark(side) zone[C.-H. Lee et al., J. Acoust. Soc. Am. 111, 3053(2007)], without any spatial weighting in spatial averaging of acoustic potential energy. Recently, we're trying to improve the control performance by giving spatial weighting in spatial averaging process because how to give spatial weighting has to do with the improvement of control performance to satisfy the original purpose of personal audio system more closely. In this paper, it will be covered the investigation for how to give spatial weighting in averaging process and shown experimental evaluations for a sound focused personal audio system. [supported by the Korea Science and Engineering Foundation (KOSEF) through the National Research Lab. Program funded by the Ministry of Science and Technology (M10500000112-05J0000-11210)]