Large Signal Performance Of Micromachined Silicon Condenser Microphones

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Summary

A mathematical model for the open-circuit output voltage of a micromachined silicon condenser microphone with a single deeply corrugated diaphragm as a function of the applied acoustic pressure is presented. The model, basically a sine-series function, can easily yield closed-form expressions for the amplitudes of the output components resulting from a multisinusoidal input acoustic pressure. The special case of an equal-amplitude two-tone acoustic pressure input is considered in detail. The results show that the microphone generates only odd-order harmonic and intermodulation products. The results also show that the amplitudes of these components are strongly dependent on the microphone parameters, the corrugation depth and the ratio between the half-length of the diaphragm and its thickness. Moreover, the results show that the acoustic pressure required to produce a pre-specified output open-circuit voltage is strongly dependent on these parameters. (c) 2006 Elsevier Ltd. All rights reserved.

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