May I draw attention to what I believe to be an incorrect conclusion in the article on "Distortion in Electrostatic Loudspeakers" (February issue)? I refer to Fig. 4 (page 55) where two conducting faces of the diaphragm carry each a constant charge Q. In the formulæ given the field between the layers due to the inequality of their potentials V_1 and V_2 is neglected. This is not warranted.

When the distances between the faces and the fixed electrodes are again $d-x$ and $d+x$ the correct potentials are given by:

$$V_1 = \frac{Q}{\varkappa A}(d-x)\,\frac{d+x+\frac{1}{2}\delta}{d+\frac{1}{2}\delta}$$

$$V = \frac{Q}{\varkappa A}(d+x)\,\frac{d-x+\frac{1}{2}\delta}{d+\frac{1}{2}\delta}$$

where δ is the thickness of the diaphragm.

One concludes that when δ approaches zero the potentials reduce to the value for a single layer with total charge 2Q. This can be easily understood by noting that the infinite capacity between the layers makes V_1 and V_2 equal.

Calculation of the net force on the diaphragm yields:

$$F = \left(\frac{V_1}{d-x} - \frac{V_2}{(d+x)}\right) Q = \frac{Q^2}{\varkappa A}\,\frac{2x}{d+\frac{1}{2}\delta}$$

This formula shows that separation of the charge on the diaphragm into two equal parts still results in a force when the diaphragm is moved away from its equilibrium position. The situation is thus similar to that pictured in Fig. 3 of the article. The separation of the charge according to Fig. 4 has no advantage over the situation shown in Fig. 3.

For constant-charge operation the force is linear in x. In order to maintain stability the diaphragm needs to be stretched. When the suspension is linear the loudspeaker will operate without distortion. This is so because the signal force is exactly proportional to the signal voltage (even when the latter is fed asymmetrically to the fixed electrodes).

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