Example: Brillouin Self-cancellation

Scattering of guided optical beams by surface acoustic waves in thin films

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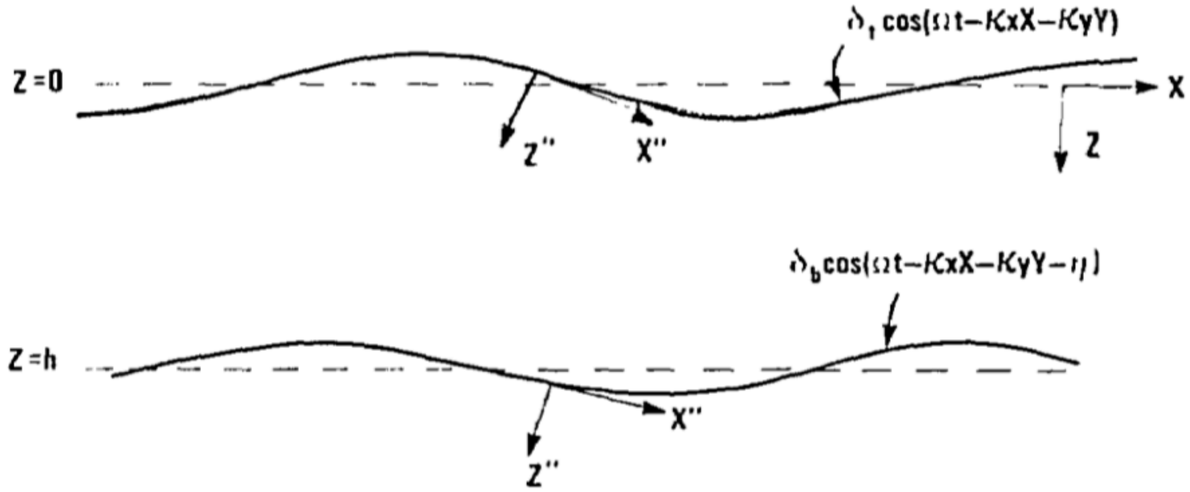

FIG. 4. Acoustically corrugated film surfaces.

"Numerical calculations for thin films of As2S3 and Corning 7059 glass on fused silica substrates indicate that the **elasto-optic effect does not always dominate the scattering cross section and that the corrugation mechanism must often be taken into account."**
G.I. Stegeman - 1979

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The full Brillouin gain calculation

$$\left(v_p\partial_z + \partial_t + v_p\alpha_p/2\right)\tilde{a}_p = -i\tilde{g}_0\tilde{a}_s\tilde{b}$$

$$\left(\pm v_s\partial_z + \partial_t + v_s\alpha_s/2\right)\tilde{a}_s = -i\tilde{g}_0^*\tilde{b}^*\tilde{a}_p$$

$$\left[v_m\partial_z + \partial_t + \left(i\Delta_m + \gamma_m/2\right)\right]\tilde{b} = -i\tilde{g}_0^*\tilde{a}_s^*\tilde{a}_p,$$

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