Birefringent Gratings to Be Used as Polarized Colour-separator for Liquid Crystal Displays

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Problem

LCD – an inefficient system

The light efficiency is below 10% is because of the use of absorption based polarizers and colour filters.

How could the performance be improved?

Alternative approach

- Grating was designed such that,
  - 0th diffraction order is evanescent,
  - 1st diffraction order propagates normal to the surface,
  - Colours are separated.

- Grooves are filled with birefringent material to select polarization such that,
  - P-polarization is blocked,
  - S-polarization is diffracted.

Near field

- \( n_0 = n_g \): p-polarization is totally reflected.
- \( n_0 > n_g \): s-polarization is diffracted.

Far field

The diffracted transmitted intensity strongly depends on incident angles and has high contrast ratio for angles of interest.