Abstract

A liquid crystal display (commonly abbreviated LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. It is prized by engineers because it uses very small amounts of electric power, and is therefore suitable for use in battery-powered electronic devices.

Objective

The aim of our project is to improve the response time of the following six type of LCDS:

• Twisted Nematic (TN)
• Super Twisted Nematic (STN)
• Electrically controlled birefringence cell (ECB)
• Bend-aligned cell (π-cell)
• Vertical Aligned Nematic (VAN)
• Hybrid Aligned Nematic (HAN).
We will use the MOUSE-LCD to optimize the properties of LCD and Matlabs to handle the complicated calculation. Parameter have been configured when the optimization.

The following is our optimizing procedure:

1. Design
2. Simulation Calculation
3. Optimization
4. Optimized LCD
5. Compare with other
The response time of six cell have been improved.

<table>
<thead>
<tr>
<th></th>
<th>HAN-cell</th>
<th>STN-cell</th>
<th>TN-cell</th>
<th>VAN-cell</th>
<th>Half PI-cell</th>
<th>ECB-cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmittance</td>
<td>0.2309</td>
<td>0.3916</td>
<td>0.3027</td>
<td>0.3664</td>
<td>0.3564</td>
<td>0.4117</td>
</tr>
<tr>
<td>Contrast</td>
<td>198.88</td>
<td>172.7</td>
<td>195.81</td>
<td>325.18</td>
<td>48.057</td>
<td>410.7</td>
</tr>
<tr>
<td>T_on(ms)</td>
<td>0.407</td>
<td>15.172</td>
<td>4.044</td>
<td>0.761</td>
<td>4.042</td>
<td>0.809</td>
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<tr>
<td>T_off(ms)</td>
<td>12.024</td>
<td>27.235</td>
<td>5.099</td>
<td>5.222</td>
<td>9.643</td>
<td>3.087</td>
</tr>
<tr>
<td>T_total(ms)</td>
<td>12.431</td>
<td>42.407</td>
<td>9.143</td>
<td>5.983</td>
<td>13.685</td>
<td>3.896</td>
</tr>
</tbody>
</table>

The following will affect the response time a lot:
1. Thickness of LC
2. The backflow effect
3. The LC materials
4. The viscosity

LCD Optimization and Modeling