Homogenizer / Diffuser

Homogenizer/Diffuser diffractive optical elements (DOE) allow conversion of a single or multi-mode input beam into a well-defined output beam, characterized with a desired shape, and uniform intensity.

**FEATURES**
- Uniform / Tailored intensity profile
- Any output shape or symmetry
- Works with single or multi-mode input beams
- Low centration requirement
- High-power threshold
- Wavelengths from UV to IR
- Optional AR/AR coating

**APPLICATIONS**
- Laser homogenizing/shaping
- Material Processing applications: perforation, ablation, derailing, marking, scribing and welding
- Medical/aesthetic laser skin treatment
- Beam shaping for Excimer lasers
- Hot spot reducer

The Homogenizer/Diffuser DOE is mainly beneficial with improved uniform exposure. When sharp shaped edges are required, while keeping small divergence, and enabling high transmission efficiency.

The most common shapes are: round, square, rectangular, elliptical and hexagonal. However, almost any shape of image can be designed. Also possible, is a tailored intensity distribution of the image, so that different areas present higher/lower energy.

**HOLO/OR** can also design a Multi-level diffuser DOE to achieve higher efficiency.

**HIGH HOMOGENEITY SERIES (RH/HH/XH):**

**HOLO/OR** developed a new class of homogenizers with enhanced performance referred to as the “high homogeneity” series. Its advantages are: higher homogeneity, lower zero order. Also, it corresponds well with input beams of lower M2.

Tel +972-8-940-9687       www.holoor.com
Fax +972-8-940-9606      holoor@holoor.co.il

Einstein 13B, Science Park Ness Tziona 7403617
1. Common homogenizer / diffuser elements are manufactured on a DOE window.

Since the homogenizer defines a certain diffusion angle, the customer is able control the image size on the image plane by choosing a focusing lens with a correct EFL.

Typical set up for homogenizer is presented below:

2. **HOLO/OR** has the capability to design an integrated solution:

   combining the DOE window and a specific focusing lens into one single hybrid element. Here, the diffractive pattern will be etched on the Plano side of the focusing lens (plano-convex lens). The advantage of this solution includes less optical surfaces, compact dimension and low weight.

3. Additional improvement in the performance may be achieved by using a high M2 input beam.

**SPECIFICATION RANGE**

<table>
<thead>
<tr>
<th>Materials</th>
<th>Fused Silica, ZnSe</th>
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</thead>
<tbody>
<tr>
<td>Wavelength range</td>
<td>193 nm to 10.6 um</td>
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<tr>
<td>Pattern angles@532nm</td>
<td>Few mRad to 160°</td>
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<tr>
<td>Doe design</td>
<td>2-level (binary) to 16-level</td>
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<tr>
<td>Diffraction efficiency</td>
<td>75%-98%</td>
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<tr>
<td>Element size</td>
<td>2mm to 100 mm</td>
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<tr>
<td>Coating (optional)</td>
<td>AR/AR coating</td>
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<tr>
<td>Custom design</td>
<td>Tailored shape and intensity distribution</td>
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