

Re: How to calculate achievable flashlight beam divergence

Source: <http://sci.tech-archive.net/Archive/sci.optics/2006-01/msg00039.html>

- *From:* Jim Klein <jameseklein@xxxxxxxxxxxxxx>
 - *Date:* Sat, 07 Jan 2006 19:39:51 GMT
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"Joe D." <joe@xxxxxxxxxxxxxx> wrote:

> Assuming a typical white-light flashlight with a parabolic reflector,
> how do I calculate the achievable beam divergence?
>
> I know it involves the source size, reflector size and focal ratio
> but I can't find the formula.
>
> Also, if you focus the light so the beam is initially convergent,
> how do I calculate the achievable distance limit for a given beam
> spot size, and how does that vary with different reflector sizes, f/ratios
> and source sizes?
>
> E.g, a common question is why can't a given flashlight create a
> convergent beam that makes a small spot at a great distance.
> Any formula to calculate this is appreciated.
>
> --- Joe D.
>
>

Assuming the center of the bulb is at the focus of the parabola,
measure the distance from the center of the bulb to the vertex of the
parabols (probably the distance from the center of the bulb to where
the bulb comes out through the hole in the reflector. Call this the FL
of focal length.

Measure the diameter of the bulb, call it D

The full angle divergence angle will be close to the $\arctan(D/FL)$.

This is approximate but ought to be close.

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Engineering Calculations
<http://www.ecalculations.com>

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Engineering Calculations is the home of
the KDP-2 Optical Design Program
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1-818-507-5706 (Voice and Fax)

- *Follow-Ups:*

- ◆ *Re: How to calculate achievable flashlight beam divergence*

- ◇ *From:* Joe D.

- ◆ *Re: How to calculate achievable flashlight beam divergence*

- ◇ *From:* Jim Klein

- *References:*

- ◆ *How to calculate achievable flashlight beam divergence*

- ◇ *From:* Joe D.

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