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2006/8/6:
2007/12/5:

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Nd-YAG

(55) (1) (1.064)
(1.248)

encircled energy, spot size
modulation transfer point spread function,
optical path difference function
chromatic focal shift

55

Abstract:

An optical system has been designed with spherical lenses to focus high power (~ kJ), Nd-YAG laser (1.06) μ m with 55mm beam diameter to spot size diameter (1.248 μ m). Minimum number and thin lenses were used in the design. The spot diagram, the point spread function (PSF), and accumulated energy, were used as parameters to qualify the performance of the system.

The results show the high quality of the system for laser diameter less 55mm and the a spherical lenses are necessary for larger diameters.

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(Nd-YAG)

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(1.064)

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(1.06)

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100

55

, [1,2,3]

1

(RD)

.

ZEMAX

(Cv)

[4]

.

ZEMAX

:

-1

.

-2

.

dispersion

-3

()
(11-3)
(BK7)

[5]

(optimization)

(5 , 4 ,3, 2)

(4, 3 , 2)

()

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(1)

(1.248)

(2)

(3)

(4)

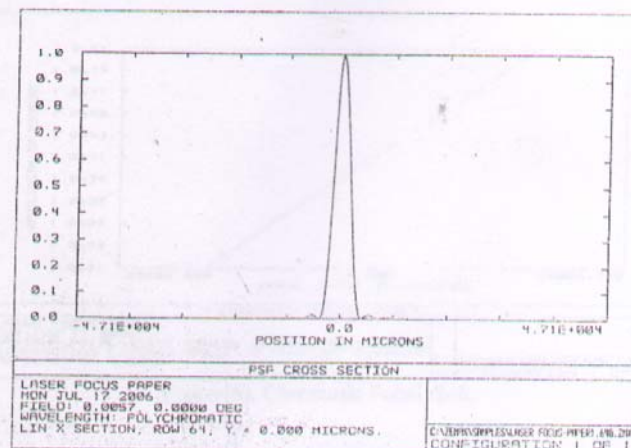
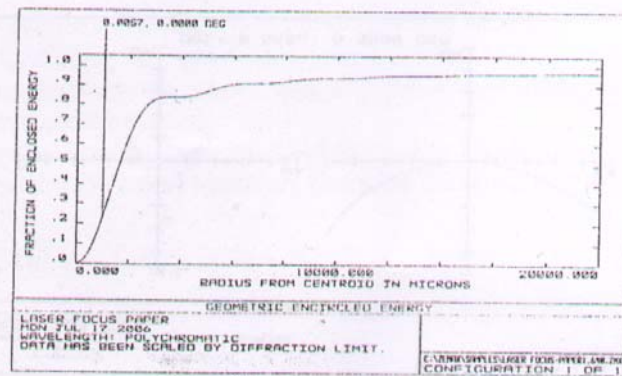
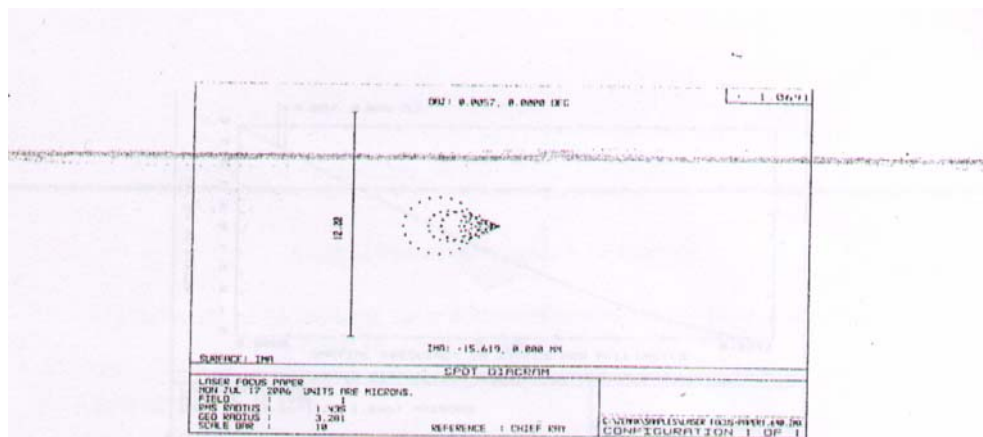
(5)

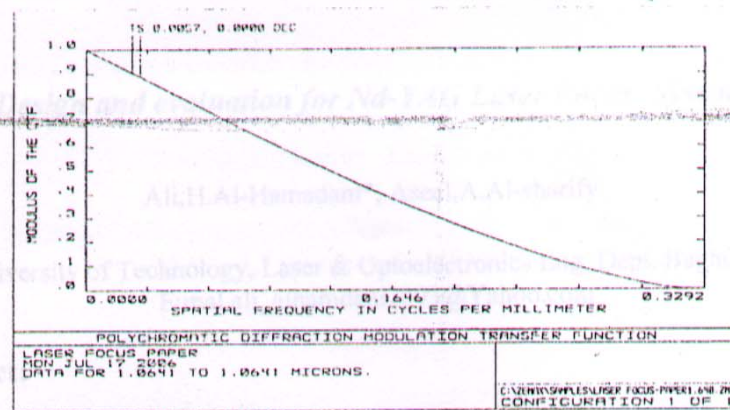
spherical aberration

(6)

26

BK7





Figure(4), Modulation Transfer Function

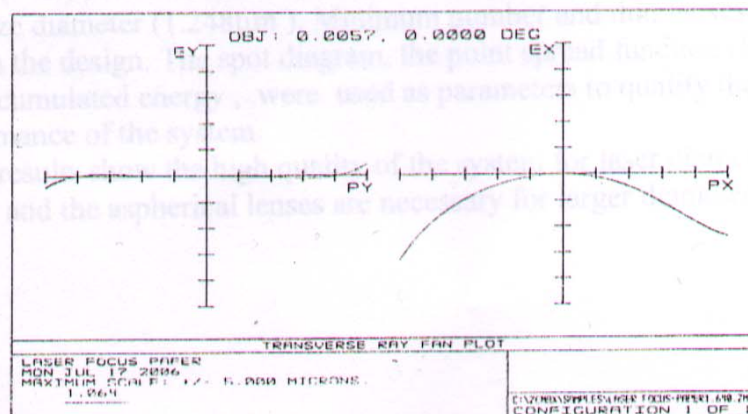
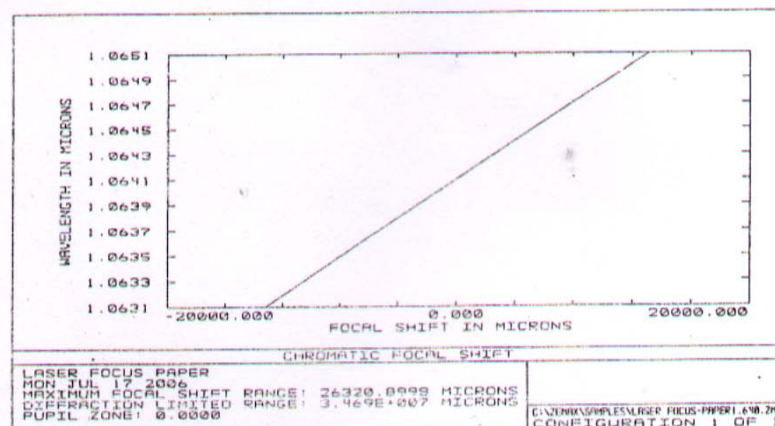


Figure (5), Transverse Ray Fan Plot.



Figure(6), Chromatic Focal shift.

(1)

<i>Surface N0.</i>	<i>type</i>	<i>Radius mm</i>	<i>Thickness mm</i>	<i>Glass</i>	<i>Diameter mm</i>
<i>Object</i>	<i>standard</i>	∞	∞	<i>air</i>	
<i>Stop surface</i>	<i>standard</i>	∞	<i>0</i>	<i>air</i>	<i>55</i>
<i>surface2</i>	<i>standard</i>	<i>286.892</i>	<i>11</i>	<i>BK7</i>	<i>54.00026</i>
<i>surface3</i>	<i>standard</i>	<i>283.545</i>	<i>3.53</i>	<i>air</i>	<i>54.29008</i>
<i>surface4</i>	<i>standard</i>	<i>288.581</i>	<i>8.98</i>	<i>BK7</i>	<i>54.29932</i>
<i>surface5</i>	<i>standard</i>	<i>283.873</i>	<i>153391.7</i>	<i>air</i>	<i>53.73693</i>
<i>image</i>	<i>standard</i>	<i>0</i>	∞	<i>air</i>	<i>31.24455</i>

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4- ZEMAX, "Optical Design Program" Users Guide, Version 8.0, www.focus-software.com.

4- NIVHOLAS D.J.I., *Optica Acta* "the use of perturbed aspheric in multi-wave length focusing optics", 31,9, 1069-1078, (1984).

1-Reddy KL., *Indian journal of pure & applied physics*, "2-line resolution studies apodized optical – system in coherent illumination", 33,7, (1995), 380.

2-RAO VL., *Indian journal of pure & applied physics*, "Effect of apodization on the peak intensity ratio in the image of 2-points objects", 33,2, (1995), 97.

3- RAO BRM., *defense science journal*, "Modulation of rectangular and triangular bar targets by optical system using hamming filters", 47,2, (1997), 217.