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## Exercise

### Lecture Optical design with Zemax– Part 8

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## 8 Correction

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### 8.1 Correction with Buried Surface

Select an achromatic system with focal length  $f = 50$  mm out of a vendor catalog. For an incoming collimated beam diameter of 10 mm this gives a nearly diffraction limited imaging quality for  $\lambda = 546$  nm. Now increase the numerical aperture by inserting a aplanatic concentric lens with thickness 3 mm and made of the glass F9. Now a broadband spectrum is considered, which is characterized by the wavelengths e F' C'. Show, that the performance for blue and red is not diffraction limited.

In the next step, the meniscus lens is splitted into a cemented component, where the second lens is made of the glass SK16. This gives a buried surface lens. Show, that the correction for green is not perturbed. Is the spot better or unchanged ? Improve now the chromatic correction by optimizing the cemented surface of the buried component. Is the performance diffraction limited over the complete spectral range ? Now re-optimize the first achromatic component only with the radii. What is the overall performance now ?

In a last step, combine the system with a the reversed version to get a perfect symmetrical system. The distance between the two parts should be 2 mm. Show that for a finite field of height 3 mm the asymmetrical aberrations vanish completely. What is the remaining and dominating aberration ?