

Networks of local minima for EUV mirror systems

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Introduction

Local minima situated in a multidimensional merit function space are connected via links that contain saddle points and form a network¹.

Network detection

- 1) start from a local minimum
- 2) detect all saddle points connected with the local minimum
- 3) local optimization downwards on both sides of the saddle points -> local minima
- 4) perform 2) and 3) for all new local minima
- 5) select the best solutions

Application

The best systems (represented in blue in Fig.1 and Fig.2) remain in the network even when the number of constraints is changed.

Conditions: variables: 6 curvatures
constraints: paraxial telecentricity
magnification

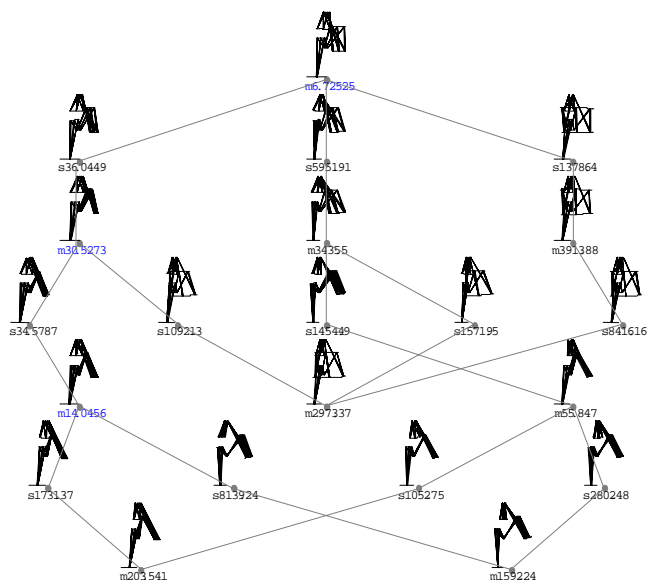


Fig.1 Network structure of a six-mirror system, situated in a four-dimensional merit function space. S represents the saddle points. M represents the minima. The value of the merit function is also shown.

Conditions: variables: 6 curvatures
constraints: paraxial telecentricity

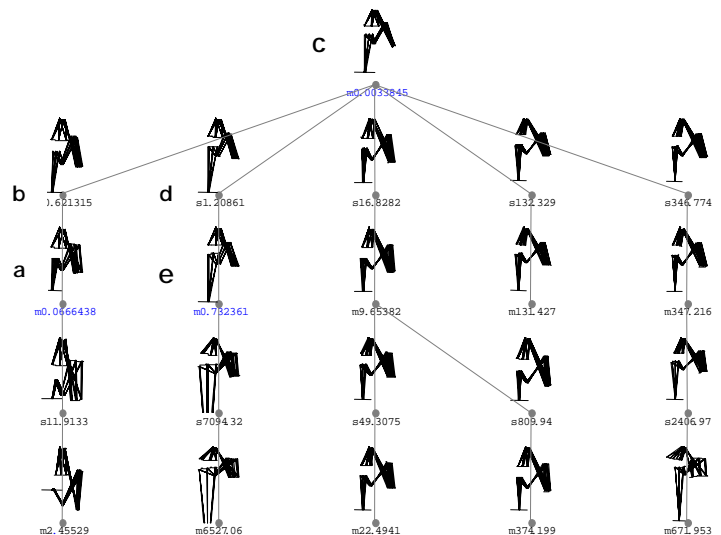


Fig.2 Network structure of a six-mirror system, situated in a five-dimensional merit function space. S represents the saddle points. M represents the local minima. The value of the merit function is also shown.

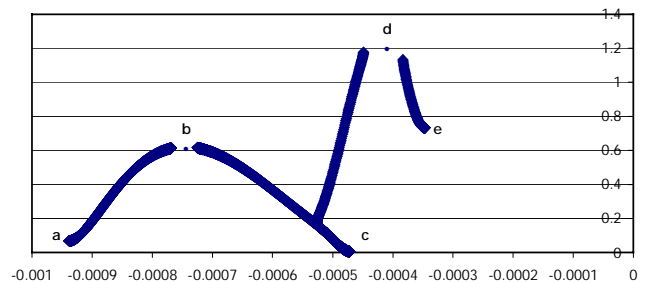


Fig.3 Evolution of the merit function along the link. On the x-axis the curvature of surface number three is represented. Systems a, b, c, d and e are shown in Fig. 2.

The method presented provides insight in the topography of the merit function space.

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Reference

1. F. Bociort, E. van Driel, A. Serebriakov, "Networks of local minima in optical system optimization", *Optics Letters* **29**, 189-191 (2004)