**Fabrication method for non-integrated parabolic mirror based on laser spot image processing and plums line.**

Hossein arbab

University of Kashan

**Abstract 1)**

Many future solar power plants will use very large numbers of parabolic mirror collectors. Moreover there are several practical reasons (cost, thermal radiation and convection losses) to keep the dimensions of a parabolic mirror small. Hence, methods for designing high quality parabolic mirrors at relative low cost, such as the one discussed in this paper, are potentially of great importance. Therefore topics discussed in this article are focused on a fabrication method for non-integrated parabolic mirrors. In this method reflective surface of the mirror is formed with different shapes of small flat or curved mirror elements, **MEs**. Geometrical shape of **MEs** may be equilateral triangle, hexagon, square and small segments of parabola. The method which is discussed here consists of several important steps. In the first stage of the method, a two dimensional parabolic model is made. Due to rotating the model about its axis of symmetry, a parabolic surface will be swept in space. The model is used to build up a concrete parabolic mold**,** **CPM**. The **CPM** is used to form the basket (a part of the solid structure where is holding the sheets of parabolic substrate) of the Parabolic Substrate and two secondary male and female templates. These pairs of templates are applying to form the sheet elements of parabolic substrate, **PS**. Basket and solid Structure of parabolic mirror are fabricated on the **CPM**. Finally solid Structure is installed on a turn table, **TT**. Structure of the turn table is such that its turning Surface can be adjusted in two orthogonal directions. Therefore symmetrical axis of the parabola is placed along the plumb line; **PL**. Alignments of **MEs** on the **PS** must be regulated continuously with the help of **PL** and laser beam, **LB**. The **MEs** are connected to the parabolic substrate by silicone glue, **SG** in coaxial circular bands, **CB**. In order to regulate the alignments of **MEs** in correct configuration, laser beam, **LB** is passed through the focal point of parabolic mirror and reflected back along its symmetrical axis. In this study, it is assumed that the opening diameter of parabolic mirror is much smaller than the diameter of Earth. This assumption is met in all practical situations very carefully. Orientation of **MEs** on the substrate will be correct if the reflected **LB** to be along the **PL**. To control this, the position of the plumbs bob, **PB** must be adjusted once on a mirror element in each **CB** and its supporting position is kept constant on a white screen, **WS**. Deviation of **PB** from the vertical direction causes the reflected **LB** to illuminate spot on a screen .Alignment of **MEs** must be adjusted so that the reflected **LB** lightening **PL** supporting point on the screen. For safety reasons, laser spot processing is done by using the **CCTV** technology. Before hardening **SG**, alignments of **MEs** must be changed continuously one by one on the **CB**.

**Keywords**: Non-integrated Parabolic Mirror- Plumb Line - Laser Spot Image Processing-Solar Dish-Turn Table - Focal Length

Published by Springer (Optical society of India)

**Analysis of Reflected Intensities of Linearly Polarized Electromagnetic Plane Waves on Parabolic boundary surfaces with different focal length**

Hosein arbab

University of Kashan

**Abstract 2)**

The aim of the study is to investigate the reflection of linearly polarized electromagnetic plane wave from common parabolic boundary surface between two different mediums. For this purpose, a discrete model is developed for the analysis of reflected power. Results of the study show that reflection of incident wave depends on the optical properties of two mediums besides the boundary surface geometry. Furthermore, results imply that when the opening area of parabola keeps constant and the focal length is changing, the contribution of S and P components of incident wave differs with respect to changing the focal length.

**Keywords:** Parabolic solar dish, Electromagnetic wave, Polarization, Flat square elements, Focal length, Fresnel coefficients

Published by Springer (Optical society of India)

**Biography**

Hossein arbab joins Kashan University as a teacher and researcher in the physics department. He is interested in doing physics training and innovative technical projects which are making physics to be interesting، applicable and simple. He has begun his job since 1992 in the fields of mechanics, optics and solar energy. He is a serious advocate of environmental protection. Therefore most of his researches offer new ideas to solve the problems of using solar energy. He is the inventor of a computer tracker system which is based on image processing of telescopic bar shadow to follow the sun motion. This is a simple and accurate programmable navigator system could be used in the field of astronomy physics. He has also invented a fabrication method for non-integrated parabolic mirrors based on laser spot image processing and plumb's line. He has investigated theoretically about optimization of parabolic reflectors and mirrors on the bases of electrodynamics approach for the first time. He is also the inventor of an exclusive and fantastic evaporative cooler which could be used renewable energies such as wind and solar. Some results of his efforts and activities have been published in international journals on science and engineering.