

1) PERSONAL DETAILS



NAME: Hossein

SURNAME: Arbab

D.O.B: 5 November 1966

POSTAL ADDRESS :Islamic Republic of Iran, Isfahan state, Kashan, 6th Kilometer Ravand Road,
University of Kashan, Faculty of Science, Laser and photonic Department

TEL: +9809302665633

FAX: +98 (031)55912570

EMAIL: arbabpen@kashanu.ac.ir

2) EDUCATION:

- a) Diploma: Kashan, Technical School
- b) Undergraduate: University of Kashan, BA in Physics Teacher Training
- c) MSC: Tehran, Beheshti University, Physics of Elementary Particle
- d) PHD: Tehran, Beheshti University, Condensed Matter (Unfinished)

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3) QUALIFICATIONS/ HONORS/ AWARDS/

Iranian Physics Society's Prize for Fabrication a Two Degrees Freedom Gyroscope Model
Kerman, Conference of Physics (2001)

4) PROFESSIONAL EXPERIENCE:

Physics Teaching

Theoretical and Experimental Research on Applied Physics, Optics, Mechanics Application of Solar Energy

Graphics and Industrial Drawing

Agriculture and Gardening

Innovation of simple idea

Courses taught: General Physics-Modern Physics-Analytical Mechanics- Electromagnetic Theory - Modern Optics- Mathematical Physics-Vibration and Waves-Acoustics- Technical Projects of Physics - Technical Drawing

5) RESEARCH INTERESTS

1. **Design and fabrication of gyro compass with one degree of freedom[University of Kashan]**
2. **Design and fabrication of gyro compass with two degrees of freedom[University of Kashan]**
3. **Design an approach to fabrication method of a non-integrated parabolic mirror[University of Kashan]**
4. **Design and Fabrication of a Non –Integrated Parabolic Mirror Applied as a Solar Concentrator [University of Kashan]**
5. **Design and Fabrication of 4kw Aryan Solar Dish[University of Kashan]**
6. **Design and Manufacturing Three-Axis Computerized Turn- Table for Fabrication of Lens and Prisms [University of Kashan]**
7. **Design and Fabrication of an Advanced Computer Navigator System For Solar Dish Based on Shadow Image Processing [University of Kashan]**
8. **Design and Fabrication an Anti-Freeze High Flow Rate Water Spigot (Sealing Without Leaks) [Exclusive]**
9. **Design and Fabrication High Efficient, Safe and Friendly Environmental Cooler [Exclusive]**
10. **Design and fabrication of a mechanical system to illustrate how internal forces can be the cause of presence of external forces at system of particles.**

Domain of Activities:

Cultural Activities and Physics Teaching –Mechanics Machinery- Solar Energy-Writing- Optics – Image Processing- Technical Research and Innovations- Agriculture and Gardening- Architecture

6) PUBLICATIONS:

1. **Azimuthally electromagnetic surface waves in a rod dielectric magnetized plasma waveguide and their excitation by an annular relativistic rotating electron beam.** Plasma physics. B. Jazi B. Shokri. **H. Arbab** Controlled fusion (48) (2006) 1105-1123
2. **A computer tracking system of solar dish with two-axis degree freedoms based on picture processing of bar shadow.**
H. Arbab B. Jazi M. Rezagholizadeh, Renewable Energy, 34 (2009) 1114-1118
3. **Analysis of reflected intensities of linearly polarized electromagnetic plane waves on parabolic boundary surface with different focal length.** **H. Arbab** M. Rezagholizadeh, Springer, journal of optics (2014)
4. **A fabrication method for non-integrated parabolic mirror based on laser spot image processing and plumbs line.** **H. arbab** Springer, Journal of optics (2015)
5. **(Espesial Issue)Electrodynamics Analysis of Reflected Energy Distribution from Parabolic Boundary Interface of Two Different Optical Mediums.** Science Publishing Group (New York, USA) American Journal of Energy Engineering [ISSN: 2329-1648 (Print), 2329-163X (Online)], a peer-reviewed journal.

H. arbab (2015)

Scientific Topics of the papers include but are not limited to the following:

1. **Solar Dish**
2. **Communication Antenna.**
3. **Radio Telescope**
4. **Satellite Communications**
5. **Radar**

7) LANGUAGE SKILLS

POOR (P)

FAIR (F)

GOOD (G)

VERY GOOD (VG)

| | SPEAKING | READING | WRITING |
|---------|----------|---------|---------|
| PERSIAN | VG | VG | VG |
| ENGLISH | F | VG | VG |
| FERNCH | P | P | P |
| ARABIC | P | G | P |

8) INTERESTS/ HOBBIES:

I have an adventurous and persistent personality. I do not like to accept anything without its definitive reason. When I seriously decide to do a project, impediments and difficulties are not able to resist and tolerate against my thrust and efforts. I really believe that "Knowledge is power" (especially when it is practically useful) I like to work hard too much in order to get success in my interested subjects. I adore my life and feel that every day is a new gift from the God to me in order to raise my understanding and success. I am interesting in sports [Aerial Sports (Parachute), Running, Jogging, Swimming, Mountaineering] I watching survival and documentary films about animals – Also I am interesting in biographies of scientists and innovators – My hobbies are classical music, reading ,sports, gardening, creating simple new methods and technical innovations. I hate racism; prejudice and lazy people that they always have to say lie in order to breathe a few days more.

9) ADDITIONAL INFORMATION (Practical Expertise)

Vision without action is only dreaming, action without vision is only passing time, vision with action can change the world. Nelson Mandela



Aryan Solar Dish (Include Non-Integrated Parabolic Mirror)

This solar dish is in fact a relatively big non-integrated parabolic mirror which its opening diameter is two meters. Mirror of the device is fabricated by the help of laser spot image processing (and plumbs line) method where is invented by H. Arbab at University of Kashan. Mirror Elements are mounted on a steel substrate by silicone adhesive. Flat square mirror elements are set up on a number of regular concentric circular rings on the substrate. Temperature has been measured is 1600 ° Kelvin (without using isolated chamber).



Fabrication Method for Non-Integrated Parabolic Mirror

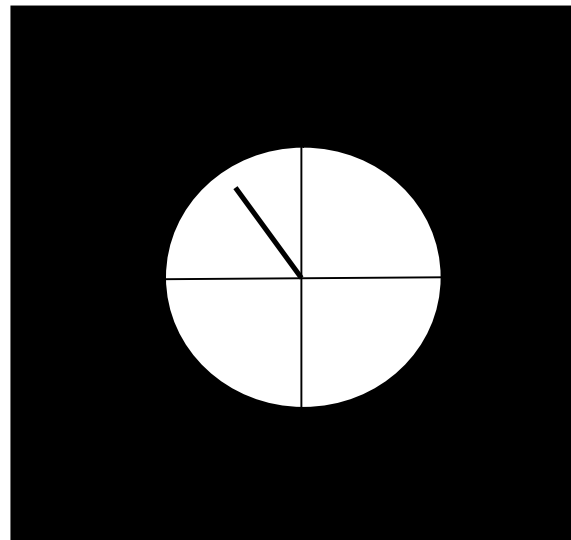


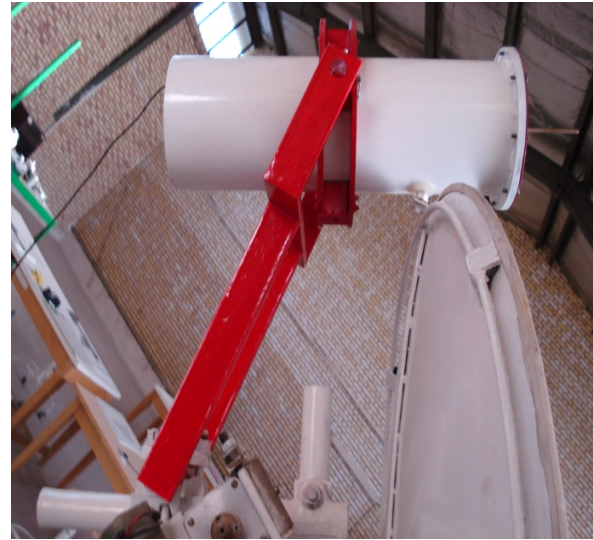
Laser Spot Image Processing

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**.

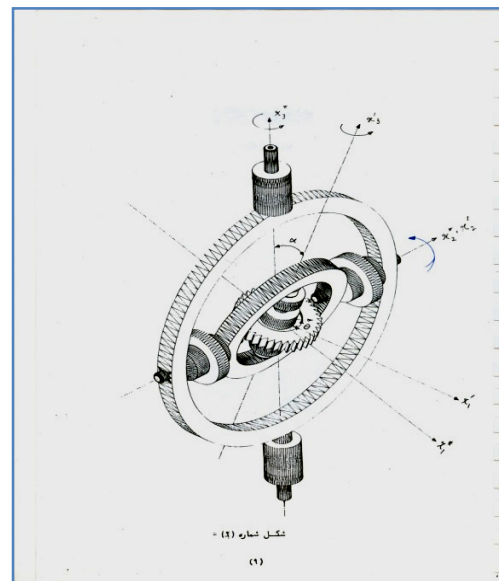
Keywords: Non-integrated Parabolic Mirror- Plumb Line - Laser Spot Image Processing-Solar Dish-Turn Table - Focal Length





Advanced Computer Navigator System is shown. It is based on Image Processing of Telescopic Bar Shadow.

Operation of this system is based on image processing of a telescopic bar shadow on a white screen. Screen is a thin white layer which is placed on the opening of a telescope pipe. A digital camera takes pictures in adjustable intervals of time. Pictures are processed by computer. Image may be formed in one of the quadrants of a two dimensional Cartesian system which is defined on the opening telescopic pipe. In conjunction with the position and dimension of an image, position of sun (or moon) would be distinguished. Operation of the system is independent with respect to the initial configuration and start time situation. By detecting the cloudy situation, the device can be placed in standby mode to save Energy. This invention has been registered in Iran and is published in details as a scientific article in the Journal of Renewable Energy. Device is designed, fabricated and sponsored in Physics department, University of Kashan I.R. Iran.



Gyroscope with Two Degrees of Freedom

Design, Fabrication of Mechanical Gyrocompass Model with Two Degrees Freedom

Hossein Arbab¹, Alireza Behnam²

1. Physics Department, Faculty of Science, University of Kashan, Kashan, I.R of Iran
2. National Observatory of Iran

Mechanical gyroscope is an important instrument with many applications. Some of applications of the device are as follows: Aeronautics and space science - navigation - military industry (advanced tanks and missiles, Submarine) the above picture shows a training model of the device which is designed and fabricated in Physics department, University of Kashan. This model uses compressed air. Not only using of the device is relatively convenient, but also it can help us to realize a real gyrocompass. Also it can be used to do some interesting experiments for Physics for laboratory educational purposes. The structure of this instrument as well as a training model is such that the hypothetical Earth can be rotates with changeable desired angular velocity both in magnitude and direction. This causes the small effect of torque of Coriolis force which is almost insensible in the real Earth would be increased and observable. It also can be used to (by changing the angular velocities) represent both restricted and unrestricted movement of an excited Gyroscope of hypothetical Earth or Rotor. Due to change the angular velocities, depth of potential well will be changed too. Therefore unrestricted rotation of Gyrocompass movement changed to oscillations in a bound state. Also Gyroscope in unexcited state can be a real Gyrocompass in a specified geographical location on the real Earth. Four Jets are installed on the rings in order to exciting the device. **Specifications:** A) Angular velocity of the turbine may be adjusted both in magnitude and direction. B) Angular velocity of virtual Earth may be adjusted both in magnitude and direction. C) Equipped with air cushions to reduce friction D) Possibility of establishment an adjustable angular velocity for Rotor and virtual Earth. E) Ability of the device for observation the different effects of kinds of fictitious torques. F) Ability of device to identify the meridian plane and longitude angle. G) Ability to conduct the compressed air from large and small circular profiles for operating the air jets and Rotor **Components:** A) lower and upper discs and other parts of the base B) small circular profile (blue circles) C) Rotor D) mounted blower and Rotor air flow. E) Large circular profiles (green ring) F) Large circular profile Jets G) small circular profile Jets H) hand and scaled parts I) control valves J) Air cushions K) Counterweights M) handle



No-spill Anti-freeze valve (Exclusive)



Computerized Scrubbing Machine with 5 Degree Freedoms

This device is used to fabricating lenses and prisms. It is a programmable machine that can create a variety of surfaces on a blade of glass. This instrument uses Gravitational force and powder scrubbing method. Beside relative rotational motion for abrasion, it has five degrees of freedom. Despite using water and electricity simultaneously in the instrument, its safety is completely assured. This device has a turn table which its operation is very simple. This device is designed and fabricated in physics department and is sponsored by University of Kashan.

Analysis of reflected intensities of linearly polarized electromagnetic plane waves on parabolic boundary surfaces with different focus lengths

Electrodynamics analysis of parabolic solar dishes was achieved for linearly_polarized electromagnetic plane wave radiation with S and P polarizations due to transferred radiation power to a cavity at focal point and its dependence on the focal length and optical properties of the substrate dishes in this model. The results of calculations implies that the efficiency of dish for radiation with S and P polarizations has different behavior with respect to focal length of parabolic reflecting surface and optical properties of conductor substrate layer. Key words: parabolic solar dish, electromagnetic wave, polarization, flat square element, focal length, Fresnel coefficients



Advanced solar Cooler (Exclusive)

Implicit Role of Internal and External Forces in the Motion of system of Particles

In the theoretical mechanics when we discuss the motion of the system of particles, we are accepting the explicit and important role of external forces. The imperfect understandings about the implicit and explicit role of internal and external forces in the system of particles may lead us towards the serious mistakes. Without the correct and conceptual understanding of the subject one cannot obtain a right vision about the whole truth. In conjunction with the laws of motion (Momentum Theorem), external forces have a direct and explicit role in a system of particles, but the role of internal forces may not be so explicit, while internal forces can play implicitly an important role in creating the external forces! For example, when the existence of external forces depends on the presence of internal forces the hidden role of the internal forces would be appeared brilliantly. In this case, external forces are due to the internal forces. For example consider a little boy can swing in a park by suitable movement of his feet

without someone else's help. This is a practical example for the importance role of internal forces in the motion of the system of particles. Then, we cannot ignore the important implicit role of internal forces. But these forces do not play an explicit role in the momentum theorem. Then our judgment about the reality cannot be correctly on our observations. Similarly in the human life we cannot attribute completely the progress or backwardness of the people living in a society to the foreigners and ignore the constructive or destructive role of the people themselves! Exactly in the same way in physics we cannot ignore the important role of internal forces on the system of particles. This simple idea can be considered as a basic subject for tens important innovations on the field of robotics and machinery. As an example you can consider a stable robot with two wheels which can be climbed up from an inclined surface. This device has fabricated by the author in physics department of university of Kashan.

7 things to give up: People pleasing, Doubting yourself, Negative thinking, Fear of failure, Criticizing yourself, Saying yes when you want to say no, Procrastination