

Alternative methods for Luneburg Lens Mounting

Zachary Au

21 August 22, 2003

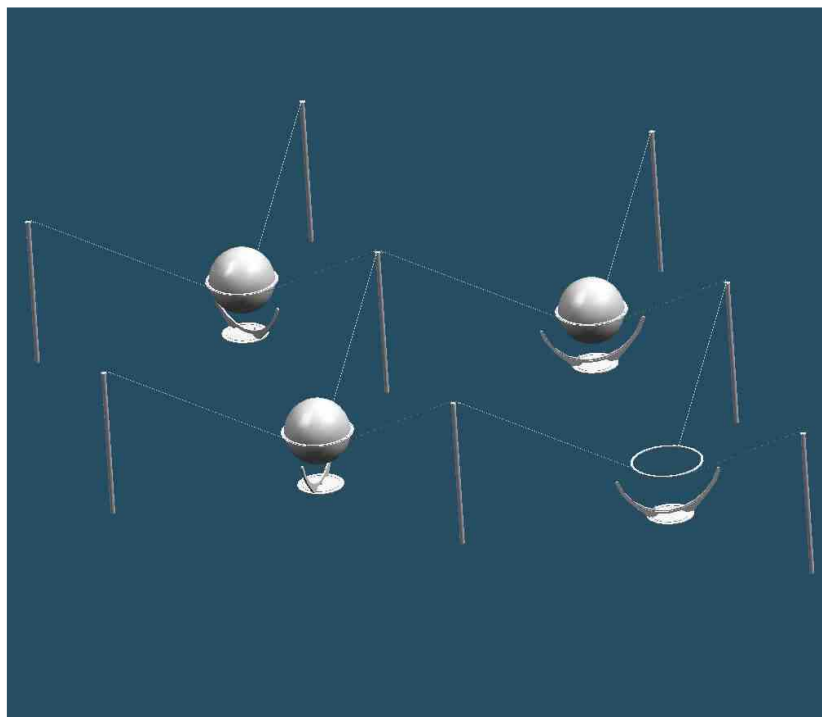
1. Introduction

In this note we are going to review the various proposals on the Luneburg Lens mounting after the Luneburg Lens demonstrator was completed. The cost effective method and the mechanical rigidity mounting are our prime goals in this review process.

2. Proposal A – hanging lens

This may be a cost effective method, as the lens will be hung up by three wires from the individual vertical pole. Since a certain number of lenses will be linked/grouped together, the number of required support poles would be reduced. In order to strengthen the lens body and to avoid the large tension acting onto the surface of the lens, a ring may made by metal or other material may be applied. The feed will be supported on the separate structure. The THK circular motion-guiding device will provide the accurate azimuth positioning and the elevation positioning. The X-Y coordinate positioning device may also be considered.

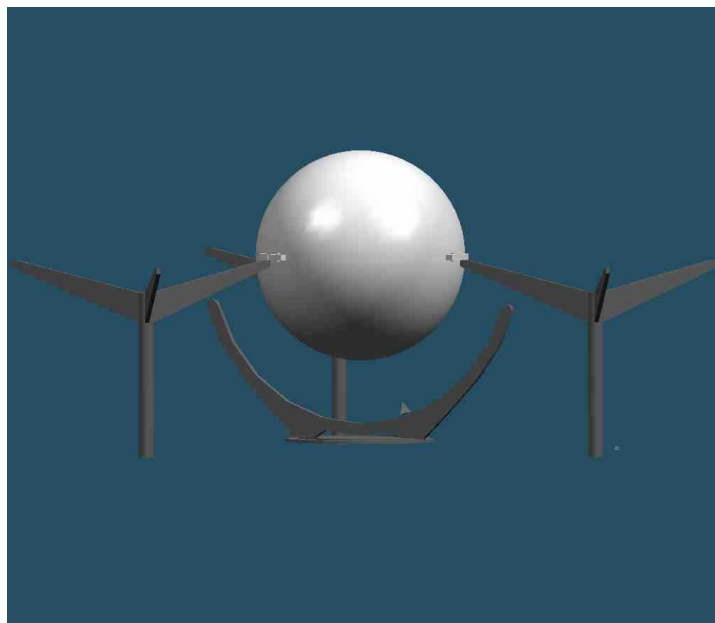
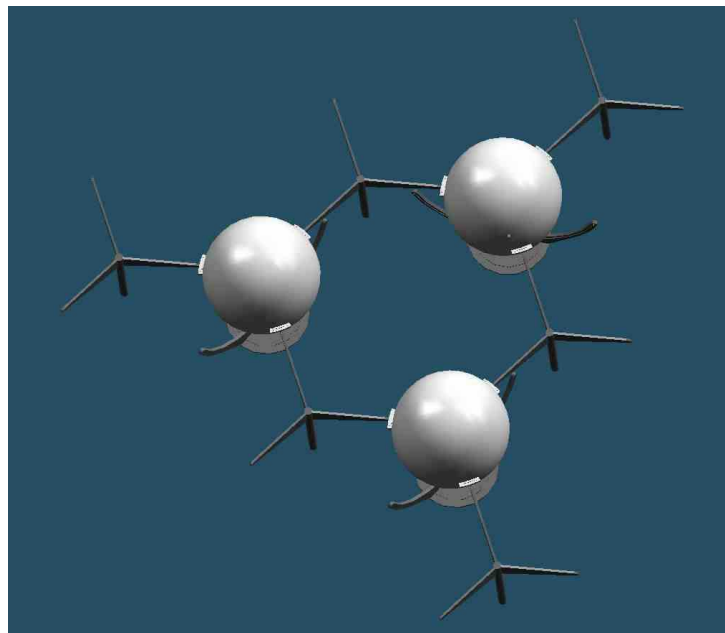
Proposal A is shown in the following picture:



3. Proposal B – three points support

This concept is similar to the proposal “A” except that the lens will be supported by the structural arm adding onto the vertical pole instead of the wires. The supporting metal ring will be eliminated that the lens will be supported by three points from the arms. The feed will be positioned onto the separate structure as well.

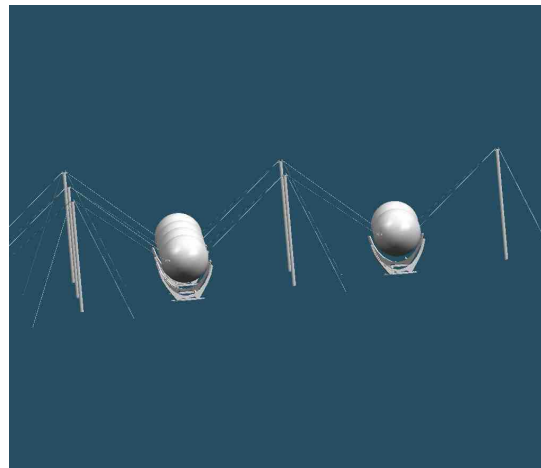
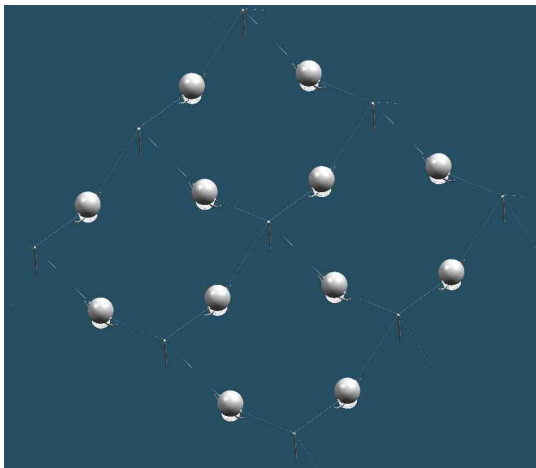
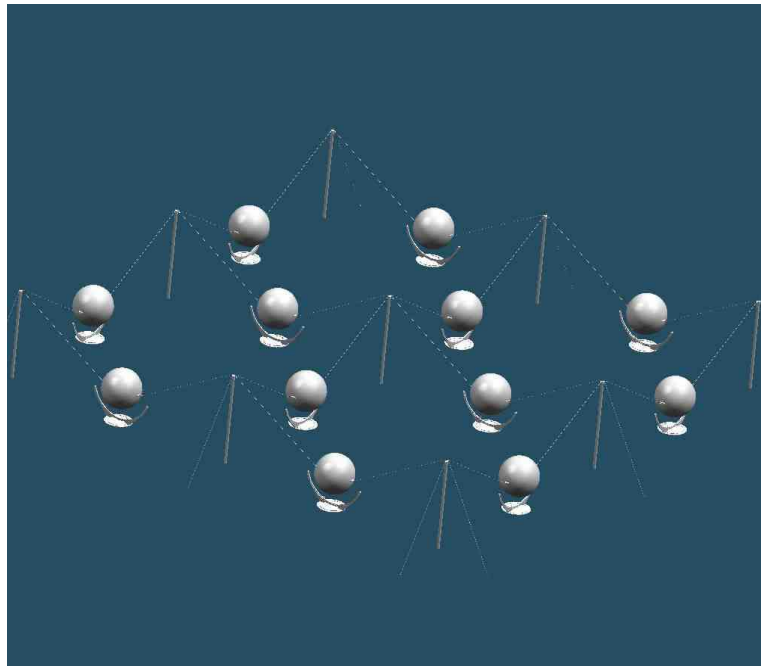
Proposal B is shown in the following picture:



4. Proposal C – axle support

The lens will be supported by two wires, the wire may go through the lens to increase mounting rigidity to the lens. Two rigid vertical poles are required to support a lens. Therefore the number of the vertical poles will be reduced significantly. The feed will be positioned onto the separate structure same as in proposal “A”.

Proposal C is shown in the following picture:



5. Discussion

Basically, the above-mentioned methods are to mount the lens by hanging, which is quite different to the existing demonstrator to support the lens by a column.

The advantages and limitations of the hanging method is listed in the following table:

Advantages	Limitations
<ul style="list-style-type: none">- Low construction cost.- Less deflection on lens due to gravity.- No blockage at the bottom section of the lens.	<ul style="list-style-type: none">- May be unstable when windy.- Metal ring may cause the RF problem.- May be difficult to achieve the concentricity between feed and lens in the field.- Only single feed per lens.

Further investigation of the wire mounting technology should be required to ensure good stability of the lens during a strong wind. The manufacturing process of the Luneberg Lens should be reviewed, with special focus on how the wire can securely connect the lens.

6. Acknowledgements

The author is grateful to Dr. Peter Hall for helpful comments and discussions.