screw connection. Contained within the outer housing are a number of inner assemblies or "terminus."

[0005] An example of a terminus 400 is shown in Figs. 4a and 4b. Each terminus 400 comprises a sleeve 401, a ferrule assembly 408 contained within the sleeve 401 and adapted to receive a fiber 402, and a ball lens 440 at a mating end of the sleeve 401 optically coupled to the fiber 402. The ball lens serves to expand and collimate light through (or near) the connector interface. When two expanded-beam connectors are mated as shown in Fig. 4b, the terminus 400 is mated with a similar connector 400' such that there is an air gap 421 between the ball lens 440, 440' of each terminus 400, 400'. Such a connector is disclosed, for example, in U.S. Patent No. 7,775,725 (herein the "'725 patent") incorporated by reference in its entirety.

[0006] As mentioned above, the beam is expanded and focused by virtue of a glass lens. In a multi-mode embodiment, shown in Figs. 4(a) and (b), a spacer 480 is used to space the fiber end face a distance away from the lens surface at the focal point of the ball lens. For a single-mode expanded-beam connector 500 configuration, shown in Figs. 5 (a) and (b), a glass material is used to produce a ball lens that has a focal point 590 precisely on the lens surface 540a so that the fiber end face can be brought in direct physical contact with the lens and prevent an air gap and reduce back reflection. Thus, the glass lens used for a single-mode expanded beam application is different from a multi-mode lens and is typically more expensive.

[0007] The problem to be solved is that regardless of whether the lens is configured for use in a multi-mode or single-mode connector, it is the most expensive component in the connector system. For large production quantities, it is therefore desirable to find a less expensive lens option.

[0008] The solution may be provided by an inexpensive molded lens body in which configurable features are readily molded into the body to provide the desired optical and alignment properties. Specifically, a lens is molded into the lens body to precisely position the focal point of the lens on the lens body surface such that the fiber can be brought into physical contact with the lens to avoid an air gap, thereby may reduce back reflection. Furthermore, the body is molded with periphery features, such that when disposed within a sleeve, the molded lens body may be precisely aligned within the sleeve.

[0008a] According to an aspect of the present invention, there is provided an expanded-beam connector comprising: a sleeve for holding at least one ferrule and one lens body, the sleeve having an interior surface having a certain geometry; a fiber having a fiber end face; the ferrule having at least one bore hole for receiving the fiber and an end face for presenting the fiber end face, the ferrule having an outer periphery at least a portion of which has the certain geometry such that said interior surface of said sleeve and said at least a portion of said outer periphery of said ferrule contact, thereby holding the ferrule in a precise radial position relative to the sleeve when disposed in the sleeve; and the lens body, the lens body being formed with a first face and a second face, the first and second faces being substantially planar, the first face configured for abutting the end face of the ferrule and configured to axially position the end face of the ferrule to optically couple the fiber end face with an interface point of the lens body, the second face having a convex surface, the interface point and the convex surface being optically coupled through the lens body, the lens body having an outer periphery at least a portion of which has the certain geometry such that said interior surface of said sleeve and said at least a portion of said outer periphery of said lens body contact, thereby holding the lens body in a precise radial position relative to the sleeve when disposed in the sleeve.

WHAT IS CLAIMED IS:

1. An expanded-beam connector comprising:

a sleeve for holding at least one ferrule and one lens body, the sleeve having an interior surface having a certain geometry;

a fiber having a fiber end face;

the ferrule having at least one bore hole for receiving the fiber and an end face for presenting the fiber end face, the ferrule having an outer periphery at least a portion of which has the certain geometry such that said interior surface of said sleeve and said at least a portion of said outer periphery of said ferrule contact, thereby holding the ferrule in a precise radial position relative to the sleeve when disposed in the sleeve; and

the lens body, the lens body being formed with a first face and a second face, the first and second faces being substantially planar, the first face configured for abutting the end face of the ferrule and configured to axially position the end face of the ferrule to optically couple the fiber end face with an interface point of the lens body, the second face having a convex surface, the interface point and the convex surface being optically coupled through the lens body, the lens body having an outer periphery at least a portion of which has the certain geometry such that said interior surface of said sleeve and said at least a portion of said outer periphery of said lens body contact, thereby holding the lens body in a precise radial position relative to the sleeve when disposed in the sleeve.

2. The connector of claim 1, wherein said lens body is molded.

3. The connector of claim 1, wherein at least a portion of the end face presenting the fiber end face is shaped to optically couple the fiber end face with the interface point.

4. The connector of claim 1, wherein the first face comprises a fiber-receiving cavity to receive a portion of the fiber protruding from the end face.

5. The connector of claim 4, wherein an air gap exists between the fiber end face and the lens body.

6. The connector of claim 5, wherein the fiber end face and said lens body have an anti-reflection coating.

7. The connector of claim 5, wherein the fiber end face has a slant angle.

8. The connector of claim 4, wherein the end face is not polished.

9. The connector of claim 4, wherein an index matching gel is disposed in the fiber-receiving cavity between the fiber end face and the interface point.

10. The connector of claim 1, wherein the fiber comprises a buffered fiber, and wherein the lens body comprises an annular portion extending from the first face, the annular portion having an inside geometry configured to receive a portion of the buffered fiber.

11. The connector of claim 10, wherein a bare fiber tip extends from the end face of the ferrule, and the first face comprises a fiber-receiving cavity to receive the bare fiber tip.

12. The connector of claim 1, wherein the second face is configured to abut a second face of a mating lens body of a mating connector.

13. The connector of claim 1, wherein the second face comprises a cavity defining the convex surface.

14. The connector of claim 1, wherein the lens body is an integrally-molded optically transparent material.

15. The connector of claim 1, wherein the material comprises polyetherimide (PEI) or polyethersulfone (PESU).

16. The connector of claim 1, wherein said certain geometry is cylindrical.