

Discussion-5: Viewing

Discussion Topic:

One key aspect of orthographic projections is preserving object size regardless of depth. How does this feature benefit certain applications, such as architectural visualization or technical drawings?

Be sure to post an initial, substantive post by Thursday at 11:59 p.m. MT, and respond to two or more classmates or the instructor with substantive responses by Sunday at 11:59 p.m. MT. A substantive initial post answers the question presented completely and/or asks a thoughtful question pertaining to the topic. Be sure your post is unique. Do not repeat what other students have said.

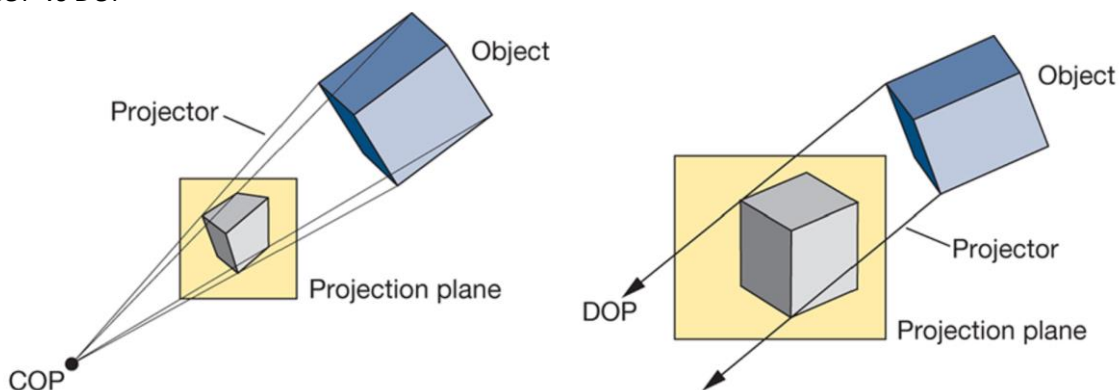
My Post:

Hello class,

Orthographic projection is a type of parallel projection. Parallel projection is a projection where rays (or projectors) are parallel whereas in Perspective projection, the rays converge towards a single point (the camera or eye). Meanwhile, Orthographic projection is when objects are projected perpendicularly onto the viewing plane, maintaining their dimensions. Multiple differences exist between the two projections see Table 1; however, the key difference between Orthographic and Perspective projections is that in Orthographic projection, the size and shape of objects remain consistent on the projection plane without perspective distortion (Adware, 2020). Perspective distortion occurs in a Perspective projection as an object gets further away from the Center of Projection (COP) distortion the shape of the object. Figure 1 illustrates the two projections.

Figure 1

COP vs DOP



Note: The Center of Projection (COP) represents a Perspective Projection, and the Direction of Projection (DOP) represents the Parallel Projection. From Chapter 5: Viewing. Interactive computer graphics. 8th edition, p134, by Angel and Shreiner (2020).

Table 1***Difference Between Parallel Projection and Perspective Projection***

SR.NO	Parallel Projection	Perspective Projection
1	Parallel projection represents the object in a different way like telescope.	Perspective projection represents the object in three dimensional way.
2	In parallel projection, these effects are not created.	In perspective projection, objects that are far away appear smaller, and objects that are near appear bigger.
3	The distance of the object from the center of projection is infinite.	The distance of the object from the center of projection is finite.
4	Parallel projection can give the accurate view of object.	Perspective projection cannot give the accurate view of object.
5	The lines of parallel projection are parallel.	The lines of perspective projection are not parallel.
6	Projector in parallel projection is parallel.	Projector in perspective projection is not parallel.
7	Two types of parallel projection : 1.Orthographic, 2.Oblique	Three types of perspective projection: 1.one point perspective, 2.Two point perspective, 3. Three point perspective,
8	It does not form realistic view of object.	It forms a realistic view of object.

Note: From “Difference between Parallel and Perspective Projection in Computer Graphics” by Aware (2020).

As listed in the table above Orthographic projection is one of the two types of Parallel projection, and it is used to represent 3D objects in two dimensions by projecting them orthogonally onto a viewing plane. It is commonly used in drawings, architectural designs, and Computer-Aided Design (CAD) for 3D modeling, where preserving the true dimensions of objects without introducing perspective distortion is crucial.

By preserving the size of the object without distortion, orthographic projection offers clear advantages for the fields listed above.

In drawings, it allows for the accurate representation of objects’ dimensions, bringing clarity and a better understanding of the object's shape, which is essential for technical drawings.

In architectural design, Orthographic projection preserves the true dimensions of building elements such as walls, windows, and doors, ensuring that these dimensions are accurately communicated to builders and that the final construction reflects the architect(s)'s intent.

In Computer-Aided Design (CAD) for 3D modeling, Orthographic projection prevents perspective distortion of the object dimensions allowing 3D prevents perspective distortion, allowing 3D models to retain the objects' true dimensions when scaled up or down, making the models easily transferable for use in simulations and manufacturing.

To summarize, Orthographic projection is a type of Parallel projection, where an object is projected orthogonally onto a viewing plane. The key difference between Orthographic projection and Perspective projection is that Orthographic projection preserves the size and shape of objects without distortion, while perspective projection does not. Orthographic projection is essential for fields such as drawings, architectural designs, and CAD for 3D modeling, where preserving the true dimensions of objects without introducing distortions is crucial.

-Alex

References:

Adware (2020, May 24). *Difference between parallel and perspective projection in computer graphics*. GeeksforGeeks. <https://www.geeksforgeeks.org/difference-between-parallel-and-perspective-projection-in-computer-graphics/>

Angel, E., & Shreiner, D. (2020). Chapter 5: Viewing. *Interactive computer graphics. 8th edition*. Pearson Education, Inc. ISBN: 9780135258262