

on the sphere Partial differential equations on the sphere are a type of partial differential equation (PDEs) which are solved on a sphere, rather than a flat, Euclidean space. These equations arise in many areas of mathematics, science, and engineering and are used to solve a wide range of problems, such as those related to fluid flow, heat transfer, and wave propagation. They are also used to solve problems involving spherical symmetry, such as those related to gravitational fields. Examples of partial differential equations on the sphere include the Euler equation, the Laplace equation, and the wave equation. Solutions to these equations can describe the motion of objects on the sphere, the effect of forces on objects, the temperature distribution on the sphere, or other physical phenomena. Partial differential equations on the sphere are significantly different from those in flat Euclidean space because of the curvature of the sphere. For example, the length of a line between two points on a sphere is different from a line between the same points on a flat plane, and a geodesic is the shortest path between two points as opposed to a straight line on a flat plane. Additionally, the Laplace operator is different on the sphere than on a flat plane. Despite the differences between partial differential equations on the sphere and in flat Euclidean space, numerical methods, such as finite element and finite difference methods, can be used to solve these equations with relative accuracy.