\*\*\*Something on 1D, 2D, 3D diffusion\*\*\*

Thus, by using spherical coordinates diffusion can be efficiently modelled in our three common dimensions to simulate natural phenomena. However, through describing a system with spherical coordinates our diffusion model can be expanded to any Euclidian dimension n by using the Hypersphere Generalisation, or rather the theorem of Spherical coordinates in n-dimensions, to unequivocally define the location of a particle [a, b]. As in our 2D and 3D models vector r is used in a hypersphere to define the distance from point of origin in a timestep and unequivocal coordinates are defined by using an additional angle for each Euclidian dimension n [a]. Since r2 = x2 + y2 + z2 + … + n2, vector r’s scalar length is not affected by the internal topological features of the hypersphere and it directional vector can be described by adding an angle for each coordinate axis present in the space to describe the vector’s relative location in each dimension. According to the theorem spherical coordinates in n dimension can be defined systematically, therefore one could create an algorithm to form a coordinate system for any dimension n.

Reference:

1. Weisstein, Eric W.; Hypersphere – Wolfram Mathworld – Online Resources
2. Wen, Shih; n-dimension Spherical coordinates and the volumes of the n-ball in Rn, 2014

