## Energy Cost

Let be a 3D unit vector oriented at θ and *p* be a 3D location vector. Each dipole has five attributes: strength, location, and orientation. They are denoted respectively as *Ai*, *pi=*(*xi*, *yi*, *zi*), and θ*i*. Each dipole and its attributes are distinguished by the subscript. A dipole exerts the following field around it.



where σ is a scale parameter, and is the shortest distance from *p* to the axis oriented at θ. In other words,



The objective is to maximize the following fitness measure.



with

.

## Optimization

