Subject: Re: equally spaced points on a hypersphere?
Posted by James Kuyper on Fri, 29 Oct 2004 17:24:48 GMT
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Craig Markwardt wrote:
> Matt Feinstein <nospam@here.com> writes:
>
>> I think that if 'equidistant' means that each point has the same
>> relation to -every- neighboring point, then it implies that the points
>> lie on a regular polyhedron.
>
>
> Hmm, but consider a soccer ball (truncated icosahedron). The faces
> are not all regular, and yet the nearest neighbors are all
> equidistant, no?

Nearest neighbors are equidistant, by definition. You'll never have more than one nearest neighbor, unless all of your nearest neighbors are at the same distance.

Of course, I know what you actually meant, though I can't quite figure out how to express it.

However, the original question was about a set of points which are ALL equidistant from each other. That's why the maximum is n+1, where n is the number of dimensions.

>> In any case, a lowest energy
>> configuration may only be a local minimum with respect to small
>> variations of the positions of the points, so the global properties of
>> such a minimum are not necessarily unique.
>
>
> I think if one uses a 1/r^2 potential, then there is a single global
> minimum. I guess it's possible for the iterator program to get stuck
> elsewhere.

At the very least, if you take one solution and apply an arbitrary rotation around the center of the sphere, or a reflection through an arbitrary plane passing through the center of the sphere, you will produce another solution. However, I think that there are cases with non-trivial multiple solutions, as well.