Subject: Re: CALCULATION OF AREA ON A SPHERE
Posted by James Kuyper on Thu, 23 Mar 2000 08:00:00 GMT
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Tim Cross wrote:
>
> Med Bennett wrote:
>>
>> Great circles on the sphere are the analogs of straight lines in the
>> plane. Such curves are often called geodesics. A spherical triangle is a
>> region of the sphere bounded by three arcs of geodesics.
>>
>> 1.Do any two distinct points on the sphere determine a unique geodesic?
>
> Yes. Years ago, I could prove it.

Not true for points on opposite points of the sphere. If you want to
make a close connection between spherical geometry and planar geometry,
you have to replace a "line" with a "great circle arc", and a "point"
with a "pair of diametrical opposite points". With those substitutions,
spherical geometry becomes formally identical to planar geometry, except
for the parallel postulate.

>> Do two distinct geodesics intersect in at most one point?
>
> Fuzzy language, but they intersect at zero points, one point,
> or along some geodesic that is a subset of both. Years ago, ...

Geodesics of length equal to 1/2 the circumference of the sphere can
intersect at two points, if those are their starting and ending points.

...
> Two unique triangles - it that English?

Yes.

...
> Do I have a formula for calculating the area of a spherical
> triangle? Not offhand. And I've got a job I should probably
> get back to... :-)

IIRC, the sum of the angles is linearly related to the area enclosed.
I'll leave derivation of slope and intercept as an excersize for the
reader. Hint: consider the interior and exterior area enclosed by a
spherical triangle whose sides are vanishingly small, so that the
surface seems perfectly flat in it's vicinity. That allows you to use
ordinary plane geometry to calculate the sum of the angles.