Re: My paper on dynamical stability of an Earth ring

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From: Ralph Hartley (*hartley_at_aic.nrl.navy.mil*)
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abdul.ahad@ntlworld.com wrote:
> *Ralph Hartley wrote:*

>*>Note the phrase "the stable Laplacian plane". The implication is that*
>*>a ring in *that* plane, not the planes you looked at, might be stable.*
>
> *The Laplacian plane is an instantaneous *average* that passes through*
> *the "invariable" momentum plane of the Earth−Moon−Sun gravity force, so*
> *is constantly shifting relative to the Earth's equatorial plane, as the*
> *Moon and Sun change orientation.*

From what I'm reading, it is a fixed plane, at least on human timescales. It depends on the equator, the plane of motion of the moon, and the plane of the earth's orbit, all of which are fixed. (They do change over thousands of years)

Geostationary satellites wobble around that plane with a period of ~50 years, so it can't be something that changes from month to month.

> *So I don't accept the Laplacian plane to be "fixed" relative to*
> *anything. The Earth goes around the Sun, the Moon goes around the*
> *Earth, all the planes are inclined at various angles to each other and*
> *are in constant motion.*

It is fixed, as it is defined, relative to the equator, in coordinates that move with the earth.

> *Consider that the ring has finite *width* where the inner and the outer*
> *particles of the ring are spaced apart and have differentially*
> *precessing orbits with respect to their lines of *nodes* and *apsides*.*

It is true that the Laplacian plane is a function of orbital radius, so a thick ring is much more complicated.

I do not pretend to know under what conditions a stable planetary ring can

exist. It would surprise me if the general answer were known, and not because people haven't tried.

You haven't even touched the really tricky part, the effect of collisions between ring particles.

Ralph Hartley