Re: JIMO and more?

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In article <Xns9602AE02F5C32lkajehoriuasldfjknak@151.164.30.44>, John Schutkeker wrote:
> What's the impediment? If you run it in a frictionless part of space (away
> from an atmosphere), all of the engine thrust will couple into vehicle
> speed. It may take a month or two to break orbit, but that's how ion
> drives work. Have I missed something?
>

Rockets work by throwing mass in one direction, and conservation of momentum (in an essentially no−friction environment) results in your rocket travelling in the opposite direction to the mass you throw away. You can throw the mass away at 1 m/s (as per the incorrect description in an early SF book, which I'm ashamed to admit I've forgotten the title of. Dead dogs. Anyone prompt me?), or at 1 million metres per second, and that description doesn't change. However, the engineering to achieve that *does* change. If you want to stay within the realms of ion drives, then to decrease the reaction mass requirements by a factor of 10, then you're going to have to increase the accelerating voltages by a factor of 10 in your ion drive. That will require heavier power supplies, and thicker insulation on your conductors, and wider spacing between conductors and more metal to provide the stiffness to keep the conductors separate ... lots of engineering choices. Efficiency of use of reaction mass varies as the nozzle velocity of your drive (regardless of if it's a dead dog drive or an ion drive). But the engineering to provide that nozzle velocity also varies similarly. So, the most efficient nozzle velocity for a particular type of engineering is a very complex choice. That's one of the reasons that the drives for Deep Space 1 were developed for 20−odd years before making it into space. Such drives have a "most efficient" band of drive powers, just as any other engine does, and it's probably a relatively narrow range of powers (do you have a car? If you do, it has several gears for use at different road speeds. These keep the engine operating in the "tolerable efficiency" part of it's operating conditions).

With the power supplies we have, and the drive technologies we have, there is only a certain amount of "punch" we can get per "pound" of reaction mass. Higher power drives would weigh more, so require more reaction mass, robbing the original purpose of the more powerful drive, which must now drag along the extra mass.

As I understand it, we do not have drive technologies in the field, or in the labs, or on the drawing board, or in the minds of engineers, that would

allow the sort of orbital gallivanting that you were originally talking about
(2nd Feb).

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