

INS-based Navigation for Air-Spacecraft of the Third Millennium Traveling on the Hyperbolic Trajectory, Military Version (ASTM 786-H-M), to Prevent GPS-Signal Blocking/ Blinding and EMP Attacks

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Abstract – INS (Inertial-Navigation System) employs 3 gyroscopes (to compute orientation) and 3 accelerometers (to compute position) based on the previous orientation/position going all the way to launch time. Mathematical framework is developed to convert this information available in the strap-down system (body-coördinate system) to the inertial-coördinate system, in order to enable Newton’s laws to be applicable. In contrast to GPS (Global-Positioning System, whose signal could be blocked/coördinates tempered with to generate wrong information), INS, combined with stellar (celestial) navigation, adds another safety feature by cutting off external signals and hence preventing EMP attacks on *Air-Spacecraft of the Third Millennium* traveling on the hyperbolic trajectory, military version (ASTM 786-H-M), which is launched in VTOHL (Vertical-Takeoff and Hovercraft-Landing) mode and then put into the hyperbolic trajectory using the extended-Q system (position and velocity vectors managed, simultaneously, through the normal-component-cross-product steering expressed in the hyperbolic-astrodynamical-coördinate mesh). Further check is performed through the normal-component-dot-product steering expressed in the hyperbolic-astrodynamical-coördinate mesh, accomplishing vanishing of the down-range/the cross-range errors. ASTM 786-H-M lands in the hovercraft mode (suspended above the ground, allowing passengers and cargo to be downloaded through ropes and chains), permitting the landing possible on marsh (soft muddy) landscape as well as in thick forests (wet landscape) and deserts (soft sand reserves); crew communicate among themselves through secure-encrypted messages employing cipher code. Other benefits include, practically, no upper limit on velocity (not talking about the limit imposed by special theory of relativity) and, consequently, no lower limit on travel time, traveling halfway through globe and returning without refueling, fuel (operational) efficiency, reduction of engine-failure risk and elimination of turbulence during most of the flight.

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Keywords – *Extended-Q system, Hyperbolic-astrodynamical-coördinate mesh, Marsh landing, Normal-component-cross-product steering, Normal-component-dot-product steering, Safety Features, Two-body problem*

[ASTM 786-E](#) • [ASTM 786-H](#) • [VTOHL Mode ASTM](#) • [Cipher Code for Secure-Encrypted Communications](#) • [SDI](#)

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