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Human aspects in deep space missions design

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The conventional aspects of design reach distinctive levels when considering extended manned-space journeys. Although space travel started decades ago, space design has been limited to short distance and short term trips, considering that the farthest manned trip was to the moon taking few days each way. Adding the human factor to the equation drags a long list of social and psychological features to be considered. A hundred design items related to three main areas; structure, environment, and human needs were evaluated assessing their requirements to achieve sustainable spacecraft with longer durability, minimal maintenance, and self-sufficiency. Items were analyzed according to their status whether current technology, developing technology, or future technology. Each item was mapped according to how the science, technology, and design behind it would evolve in the upcoming years. The items are mostly associated with the functions of Earthlings daily needs, re-evaluated to be suitable for space travel. Such approach provides comprehensive futuristic scenarios through surveying the progress status of each item to help answering questions including:

- How is the structure of a spacecraft affected by the social aspects of its crew?
- How much more time is anticipated for each item to be ready for testing? How do the inhabitants of a spaceship foster their daily functions and needs over the span of a mission?
- How will social life onboard develop compared to that on Earth?
- How would we evolve into a spacefaring society while the technology is being developed?

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The effects of an induced electric dipole moment due to Earth's electric field on the artificial satellites orbit

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The orbits of artificial satellites are very sensitive to a large number of disturbances, whose effects add to the main force exerted by Earth's gravitational field. The most important perturbations are caused by solar radiation pressure, the Moon's and the Sun's gravitational fields which were extensively discussed through the current literature, and must be taken into account in order to correct the orbital motion, preventing collision between satellites of close orbits. In this paper, we consider an additional effect producing acceleration on the satellite motion arising from an electric dipole moment induced by the high altitude Earth's electric field in a metallic satellite of spherical shape. The order of magnitude of such effect is estimated to be in the range of 10−23 m/s^2. It is emphasized that the Electric Dipole Moment Effect (EDME) is dependent on the satellite's shape and geometry and proportional to $E_0 v/r^4$. The Earth's electric field E_0 is largely influenced by atmospheric electromagnetic phenomena, such as whistler waves and thunderstorms.