TIE Fighter, Paper 2 of 2: Propulsion through Induction

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Abstract

It has been proposed that the TIE fighter displayed through the Star Wars film sequence is propelled using Twin Ion Engines, gaining power from large solar panels displayed on each side of the central hull. It was shown in the author's first paper that this mechanism causes significant challenges, and therefore might be a misreading of the available evidence.

In this paper, it is proposed that a form in magnetic/electrical induction would suit the TIE fighter physical depiction, as well as providing an extremely competent propulsion mechanism.

Introduction

The TIE fighter was first introduced in the 1977 film ‘Star Wars’ directed by George Lucus. The fighter remains relatively consistent through the subsequent films and other media, depicted with a central hull connecting two plates on either side, shown in Figure 1.

Figure 1, A TIE fighter:

It was shown in the previous paper that this design falls short:

- The power provided by the solar panels is insufficient.
- The thrust provided by the ion engines would not provide an effective propulsions source.
- The maneuverability of the craft is low, both through layout of the craft and the vectoring of the engines.

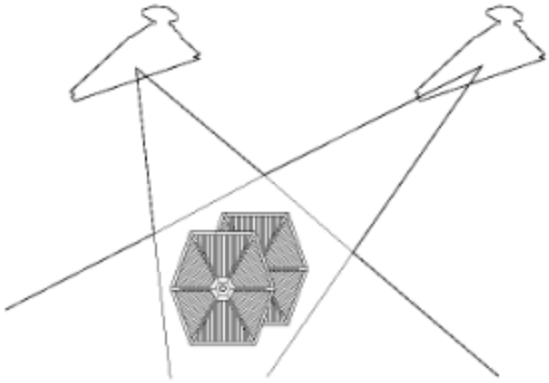
In this paper, an alternative power source will be suggested which better fits the observable properties of the Tie Fighter.

Alternate Engine

An alternate power source is proposed which overcomes the short-fallings demonstrated.

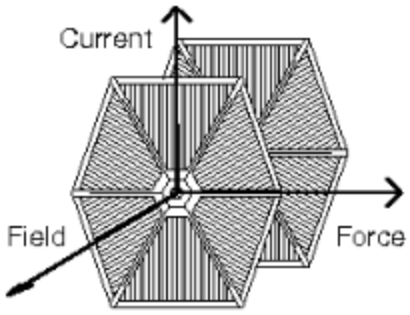
The basis of this engine is an interaction between the TIE fighter and a magnetic ‘beam’ projected by one or more other ships in the area, shown in figure 2.

Figure 2, Magnetic ‘beam’ projected from some large local ships at some distance from the fighter:



The side plates positioned at either side of the hull can now be seen to provide a housing for an electrical grating, where a unidirectional electrical current can be fed. By the interaction of a strong magnetic field and application of Flemings Left Hand Rule[8] shown in Figure 3, a considerable force can be generated with little electrical input from the TIE fighter.

Figure 3, Application of Flemings Left Hand Rule:



If the external magnetic beam was rotated continuously and predictably, it would be possible for the TIE fighter to pulse the electric current sympathetically, synchronizing the application of current with the magnetic field when pointed in a direction, yielding force in the desired direction. Therefore allowing thrust in any direction, accept the direction of the grate. Full directional force could be obtained by providing more than one grate within the plates, which could explain the distinctive hexagonal shape allowing fitting of three grates at 60 degrees to each other.

The design of two plates, located far from each other on either side of the fuselage can now be seen as optimal, as this allows the greatest rotational force on the body. This is in direct opposition to the idea of them being solar panels, where their position allowed the least rotational ability.

However one of the greatest abilities of this mechanism becomes apparent due to conservation of energy: when the fighter decelerates, breaking into the beam rather than accelerating with the beam. Under this scenario the electrical current is reversed, Fleming's Right Hand Rule comes into play and the energy expended in accelerating is captured back into electrical current. This may be used to re-charge the electrical power source on the TIE fighter. Since space offers no resistance, velocity is not lost through friction, therefore this effect could be quite efficient.

An analogy is a perfect free-wheeling bicycle, starting from the top of some hill. As it moves it will lose the potential energy of height and gain kinetic energy as speed. This can then be used to travel a distance or free-wheel up another hill of equal height. As long as no hill higher than the original was encountered, you could theoretically go on forever in this way and travel a great distance at mixed speed without expending any personal energy.

Our TIE fighter has the same principle: a transfer of electrical to kinetic energy, and back again, as many times as desired.

It can be seen that if the TIE fighter starts and completes its journey from the same hangar on a stationary platform, the fighter will perform the same vector of acceleration as deceleration in every direction. The same power is required to accelerate in one direction as will be recovered by decelerating back again. So that, never mind how long the journey, or at what velocity, no

net power would be consumed. Only the power required to account for inefficiencies within the internal power storage and transport would be required, which could be provided by a relatively small electrical generator.

An electrical circuit is, by nature, circular. Therefore unidirectional current is challenging. However, the voltage may be stepped up, lowering the current, at parts of the circuit where the wiring is moving in an undesirable direction. This requires an AC current, such as would be required anyway to synchronize with a rotating magnetic field. This also necessitates thinner lighter wires. Therefore this also fits the observable properties of the ship.

It has been shown that by adopting this interpretation of the TIE fighter architecture, the results of a maneuverable and powerful fighter which requires little or no engine, providing major advantages. They could be manufactured at far less cost, therefore in far greater numbers, which would act as a very effective force.

However some proof is required to quantitatively judge the success of this idea.

Discussion

There are other vehicles used today which make use of a similar principle, for instance magnetic levitating trains. However these react against a magnetic field close to the electrical coil where it is strong. The requirement for the TIE Fighter is a 'beam' of magnetism, as powerful hundreds of kilometers from source as at it. To complicate the requirement further, the magnetic field must rotate to provide the ability for the fighter to obtain force in any vector. This may be challenging, and is beyond current engineering knowledge today. All magnetic fields observed today form a loop from North to South from a dipole The idea of an isolated section of a field projected somewhere in the distance may be a hard challenge to produce.

The practicality of such a beam in battle may be questioned. For instance it would only take some interruption to the beam to render the TIE fighter incapable of changing direction or speed. This could be used to isolate a fighter, project the course and fire a weapon to intersect. Alternatively, another beam could be fired in opposition to that one controlling the fighter to interrupt, cancel out or miss-direct the fighter. It may be hoped that the technology used is sufficiently complex that no other party has yet worked it out.

The extent of the beam must be great, and remain tracked on the TIE fighter, even when out of site. Further the beam must be strong enough to project through some obstacles, such as asteroids and other ships. Loss of tracking would give great vulnerability to the fighter.

Last of course, the source of the beam must remain. For instance, if fired from an Imperial Star Destroyer, that Destroyer must avoid destruction for the sake of its fighters. Although a scene in the film New Hope shows the TIE fighter of Darth Vader flying off under control after the destruction of the beam source. This may require further research, but possibly beam generators

are fired into battle to aid fighters, or other feasible solutions.

Conclusion

The technology depicted within Star Wars depicts a level of science, engineering far exceeding our own. It is therefore impossible to know what solutions have been employed, since we do not know what technology remains undiscovered and what scientific discovery will be made. It is therefore impossible to suggest what forms of propulsion are used in a vehicle which is obviously very alien to anything used on Earth today.

From this premise it has been suggested that an alternate mechanism may have been employed, offering a closer correlation with that observed on the TIE fighter to that which has been offered in the past.

It has been shown that the Twin Ion Engine and Solar Panel combination supposedly used in the TIE would not provide useful thrust, and the inefficient position of the solar panels provide nothing more than a large target to shoot at.

An alternate proposal was suggested where these plates contain an electrical grate carrying a current, which would interact with an external magnetic ‘beam’ to provide a powerful and extremely efficient propulsion mechanism, requiring almost no internal engine. It was also shown that the efficiency of such a system is so high, due to recoverable power, that almost no engine would be required on board the fighter. Further, the suggested alteration provides far better maneuverability and provides an audible signature far closer to that observed in the Star Wars media.

It is therefore suggested that although we may never know the true reason for the anterior plates, or the true form of engine used, the magnetic induction mechanism described here is far better than the accepted ‘Twin Ion Engine / Solar Panel’ mechanism currently accepted.

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