About model of jet propulsion.

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Now rocket engines have reached a definite level of development and the further development of this class of engines is connected to looking up of new reserves both on power, and on design. For this purpose it is necessary closely to look at processes both in the engine, and at motion of the vehicle as a whole. The jet propulsion as any motion obeys to two fundamental laws of preservation - energy and momentum. Usually by consideration of jet propulsion only one law is used - the law of conservation of momentum in the form of Mesherskii equation, which at the definite assumptions is usually reduced to the Ziolkovsky formula. At this approach a whole class interesting and not well studied phenomena is left out of consideration.

All jet engines can be divided into four groups for the type and amount of both propulsive mass and energy. I.e. quantity of a propulsive mass can be limited, for example, propellant storage, can be unlimited - in case of operation in environment. Similarly, the storage of energy can be both restricted - that by a propellant storage, and unlimited in case of an intake of energy from the outside. At development of a particular type of engine for a specific purpose there is a problem on exact selection of the scheme of the engine, its economical characteristics. It is especially important in case of fulfillment of a problem under varying conditions at motion of spacecraft (S/C) in miscellaneous environments, or in environment and in vacuum. Also important is an optimal usage of accumulated on board working substance or power source or their together.

The elementary model was drawn up and the numerical research of jet propulsion was conducted. By introducing of engine efficiency as a relation of a useful work - turned into S/C kinetic energy to all delivered energy, the charts of efficiency change as functions from a Ziolkovsky number were built.

The particularity of jet efficiency is that it depends only on initial to end mass ratio, and also from the law of change of weight of A/C and change of power of a propulsive mass.

The obtained data allow to draw a conclusion: specific impulse is more composite function, than it is considered and varies not only at change innerballistic of parameters of the engine, and as well as the efficiency depends on external ballistics of A/C.

Thus it is possible to make following conclusions:

Usage of the generally accepted theory of engines and formulas used at their calculations has though also broad, well justified applying, but nevertheless is limited on the class of problems and engines. Namely - for engines mounted fixed on ground, for engines with a continuously exhausted jet, again or mounted on ground, or on A/C having very large weight as compared to developed thrust (very small acceleration << g).

Usage of a described above technique allows to extend the range of investigated problems, and also to optimize present methods.

Usage of the described above approaches opens capabilities for creation of new classes of engines possessing the heightened characteristics as compared to existing ones, and also for modernization of present engines.