



## Mechanical and Fluid Systems

# Improved Directed Flux Motor

Enabling compact electric motors with more torque and degrees of freedom

Electromagnetic motors typically convert electrical energy into rotational mechanical energy and are employed across a wide array of applications. While motors represent relatively mature technology, practitioners continue to seek ways to enhance motor operation including a decrease in cost, drop in size/weight, reduction in power consumption, increase in reliability, and enhanced degrees of freedom (i.e., the number of ways a machine can move within three-dimensional space). NASA GSFC has invented directed flux motors that increase degrees of freedom, albeit at the expense of device complexity and mass. Thus, the opportunity for further improvements in directed flux motors remains.

## BENEFITS

- Offers fundamentally superior freedom of motion compared to prior designs
- Employs interwoven magnetic configurations that decrease overall device size and weight
- Allows for modifications in the torque-to-speed ratio of the gearing contained within the motor
- Is easier to fabricate and will work more reliably than past designs

technology solution

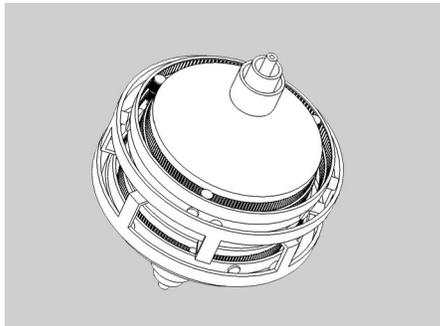


# NASA Technology Transfer Program

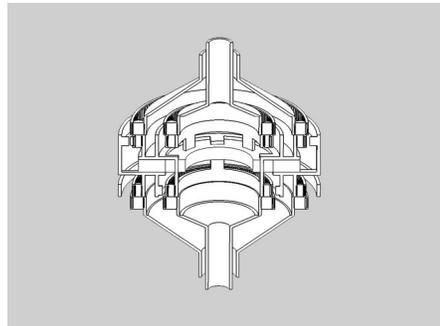
Bringing NASA Technology Down to Earth

## THE TECHNOLOGY

NASA GSFC's new Directed Flux Motor utilizes the directed magnetic flux of at least one magnet through ferrous material to drive different planetary gear sets to achieve capabilities in six actuated shafts that are grouped three to each side of the motor. The flux motor also utilizes an interwoven magnet configuration which reduces overall motor size. The motor allows for simple changes to modify the torque-to-speed ratio of the gearing contained, as well as simple configurations for up to six output shafts.



Directed Flux Motor without housing



Cross-section of Directed Flux Motor

## APPLICATIONS

The technology has several potential applications:

- Aerospace
- Automotive
- Toys

## PUBLICATIONS

U.S. Patent 7,999,427

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