Radio Frequency Antenna for a Satellite

Technological advantages

Self-Deployment: The antenna autonomously returns to its functional, deployed configuration when the constraint is released. Np need for a heating system.

Energy Efficiency: requires no electrical power for deployment, saving the satellite's power budget.

Enhanced Reliability: Eliminates the complexity and risks (e.g., short circuits, yield problems, heating issues).

High Compactness: high ratio between the stacking and deployed configurations for reduced volume.

Precision, Durable: precise geometry reproduction and better fatigue resistance compared to conventional, heat-activated shape memory alloys.

Invention synthesis

This invention is a radio frequency antenna for a space vehicle (satellite, rover...) using a super elastic shape memory alloy (like Nitinol or a Copper-based alloy) for equipment miniaturization and ease in deployment in space, especially for small platforms. The antenna, typically having four helical strands, is manufactured in its natural, expanded configuration. For launch, it is mechanically compressed into a compact stacking configuration. The invention uses a super elastic alloy which, unlike conventional shape memory alloys, doesn't require heat to revert to its original shape. When the mechanical constraint is removed in orbit, the antenna autonomously self-deploys due to the alloy's super elastic properties, acting as both the antenna and the deployment mechanism. This simplicity, energy autonomy, and high compactness make it a reliable and cost-effective solution.

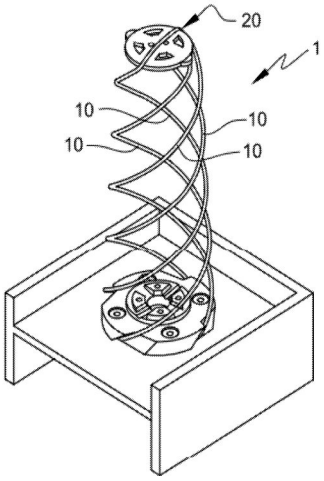
Potential applications

Nano-satellite: Ideal for small satellites with strict volume and power budget constraints.

Satellite Constellations: Facilitates the compact launch of multiple satellites on a single launcher.

Deep Space Missions/Rovers: Applicable to space vehicles and rovers.

Multi-Frequency Communication: Can operate across a wide frequency range, from 3 MHz to 10 GHz.



Antenna schematic

1. Radio frequency antenna
10. Four helical strands
20. Top of the antenna

Commercial benefits

Cost Reduction: No need for costly and complex heating systems and auxiliary deployment mechanisms.

Increased Launch Capability: The high compactness allows for more equipment or more satellites to be fitted under a single fairing.

Broader Market Access: Provides a viable, low-power antenna solution for small-platform aerospace.

Enhanced Mission Reliability: Simpler, autonomous deployment mechanism.

Material Flexibility: Uses various super elastic alloys (Cu, Ni, Ti, Fe-based) allowing for optimization based on cost or electrical conductivity needs.

Patented invention - under license.

For more information :

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