Extension to “Configuration for Orbital Flights”: Validation through DLR Research

Recent findings from the German Aerospace Center (DLR) on hypersonic technology confirm key assumptions of the proposed orbital flight concept. In particular, the description of the linear aerospike engine reinforces the efficiency and altitude-independence of thrust generation — a principle already embedded in the original design.

Linear Aerospike Engine: Altitude-Independent Thrust with Reduced Fuel Consumption

DLR identifies the aerospike engine as a core component of hypersonic aircraft. Its open geometry ensures parallel alignment of gas molecules in the exhaust stream, regardless of ambient pressure. This enables:

- **Maximum thrust at any altitude**
- **Up to 30% lower fuel consumption compared to conventional engines**
- **Optimal adaptation to atmospheric conditions without mechanical nozzle adjustments**

These characteristics align with the demands of orbital flight phases, where atmospheric density varies — a challenge already addressed in the concept through hybrid propulsion.

Cooling Challenges and Additive Manufacturing Solutions

DLR emphasizes that extreme thermal stress on aerospikes has historically been a major obstacle. The breakthrough lies in layered 3D printing, which allows complex cooling channels to be integrated directly into the spike structure. This enables:

- **Thermal stabilization at hypersonic speeds**
- **Material optimization through targeted cooling**
- **Modular propulsion architecture**

Contextualization within the Proposed Concept

In the proposed design, sonic speed is achieved without border-integrated propulsion — indicating high aerodynamic efficiency and substantial air pressure in lower atmospheric layers. This pressure can be actively used to cool the aerospike nozzles, mitigating thermal stress.

Additionally, the concept includes:

- **An auxiliary pair of jet engines** for atmospheric support
- **An electromagnetic VTOL system**, enabling vertical takeoff and landing, while also coupling with the jet propulsion — ideal for transitions between launch, climb, and orbital acceleration

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Strategic Pitch: Orbital Flight Configuration with Adaptive Propulsion

Title:
“Orbital Flight Configuration: Adaptive Propulsion for Sustainable High-Speed Access”

Core Message:
This concept introduces a modular aerospace platform capable of transitioning from atmospheric flight to orbital velocity using a hybrid propulsion system. It leverages validated aerospike technology for altitude-independent thrust and integrates electromagnetic VTOL capabilities for flexible deployment.

Key Advantages:

- ✅**Validated Efficiency**: Aerospike propulsion confirmed by DLR research — up to 30% fuel savings
- ✅**Thermal Resilience**: Advanced cooling via 3D-printed nozzle channels and ambient pressure utilization
- ✅**Modular Integration**: Combines jet, rocket, and electromagnetic systems for seamless phase transitions
- ✅**Sustainable Infrastructure**: Designed for reusability, scalability, and integration into future aerospace corridors
- ✅**Legacy-Ready**: Ideal for institutionalization through patents, licensing, and global partnerships

Target Groups:

- Aerospace investors and manufacturers
- Strategic infrastructure planners
- Regional innovation hubs (e.g., NEOM, Trojena, Chemnitz/Erzgebirge)
- Airport operators and VTOL logistics networks
