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## **Design of a Fine Guidance System for a high stability Low-Earth Orbit Mission**

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Astronomical space missions require stable and fast target pointing to achieve their science objectives. To obtain high pointing stability, a Fine Guidance System (FGS) mechanism is used to provide fine pointing control.

We developed a proof of concept FGS using piezoelectric actuators. Such a system allows for an FGS exhibiting stable pointing and fast, reliable operation.

An optical setup was designed and built to test the novel mechanism. The mechanical and thermal characteristics of the system were also studied using finite elements analysis. A software simulator was developed to study the performance of the FGS mechanism in a possible high stability spectroscopy mission.

With such a proof of concept, we showed that a reliable and fast operating FGS can be implemented using piezoelectric actuators. This would allow future astronomy missions to reach a stability of 5–10 milli-arcsec at a correction rate of up to a few hundred hertz.

This stability, together with other advantages such as the mechanical simplicity of the system, would make it ideal for many low Earth orbit satellites, for which many orbital disturbances need to be managed.

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