Development of a sensitive micro-angle sensor

**Background**

**Application**
- Dynamic motion measurement of precision stage.
- Measurement of inclination of cantilever.
- Measurement of surface profile.

**Requests to the angle sensor**
- High sensitivity
- Compact
- High speed
- Low cost

**Principle of Angle Detection**

*Analyzed with wave optics*

**Autocollimation method & QPD**

\[
\Delta \theta = \arctan \frac{\Delta d}{f}
\]

**Simulation**

The sensor sensitivity is not influenced by the focal length of the objective lens.

**Experiments**

- Sensitivity: \( D \propto \frac{\lambda}{\lambda} \)
- Resolution: 0.05 arcsec

**Specifications of the micro-angle sensor**
- Sensor size: 26mm(W) × 22mm(L) × 12mm(H)
- Resolution: 0.05 arcsec
- Responsivity: 5kHz

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