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LASERS FOR SATELLITE-BASED LIDAR SYSTEMS

Task

In order to monitor climate parameters globally, satellite-borne LIDAR systems should be used in the future. For these systems, however, tailor-made laser beam sources are needed which ensure maintenance-free operation over several years despite vibration loads and temperature fluctuations during transport and operation.

Method

To meet the requirements, an optomechanical assembly method has been developed in which the optical components are soldered onto sub-units, which are bolted to the central support plate. The adjustment is carried out using solder, which is selectively melted with electrical current. A mounting portal is used to carry out this operation. The connection technology ensures high stability, avoids organic substances and their outgassing, and allows comfortable multiple adjustment or exchange of components. In order to demonstrate the feasibility, Fraunhofer ILT is currently building a technology demonstrator model as part of the »FULAS« project (Future Laser System).

Result

Both the laser oscillator as well as the laser amplifier unit could be successfully integrated in the FULAS demonstrator. The characteristics of the laser pulses meet or exceed previous laboratory studies. Before being integrated, optomechanical subunits were qualified in a thermal cycle test.

Applications

The successful operation of the FULAS demonstrator is an important building block for the development logic of similar systems. The laser beam source for the MERLIN instrument is currently being developed and is based on the FULAS platform. Within the scope of the Franco-German MERLIN mission, it is planned to develop a satellite to measure global distributions of the greenhouse gas methane. The launch is scheduled for 2020.

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1 Preliminary design of MERLIN laser.

2 Assembly portal.