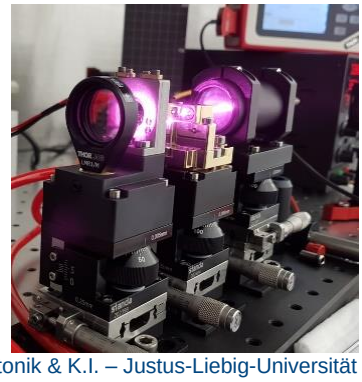
Method for determining the temperature of a laser medium

Temperature measurement, AI, laser, calibration, software

DESCRIPTION OF TECHNOLOGY

This new method allows a simple, reliable and universally applicable determination of the temperature of a laser medium during the laser operation. The measurement and evaluation are based on direct signals from the laser. The temperature-related emission characteristics are analysed using supervised machine learning with a neural network (AI).



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Temperature sensor technology is nowadays widely used and mature in both macroscopic and microscopic terms, with different resolution accuracies depending on the application. In the case of light-based variants, the problems lie particularly in the backscattered radiation or radiated heat radiation, and access to the active region itself. In addition, there must typically be sensor contact with the medium. The new method avoids these disadvantages. In contrast to conventional methods, the temperature is determined directly from the recorded laser signal without conventional signal processing and separate temperature sensors.

APPLICATION FIELDS

The process can be used in particular for contactless operation monitoring and calibration of lasers so that they can work safely, reliably and with maximum precision.

AT A GLANCE …

Application Fields

- Temperature measurement
- Monitoring
- Calibration

Business

- Measurement technology
- Laser technology

USP

- Independent of typical thermographic equipment
- Works without reflection from surface
- Works without transmission through laser medium
- without photoluminescence from the laser medium
- without measurement of thermal radiation from the laser medium

Development Status

- successful Preliminary tests with a software prototype on the reliability of the evaluation algorithm

Patent Status

Priority application, filed on 08/12/2023 at the European Patent Office.

REFERENCE NO. **TM 1210**

ADVANTAGES OVER THE PRIOR ART

The new process is particularly simple and cost-effective compared to conventional methods.

The new method works during the laser operation.

It is independent of typical thermographic equipment. No reflection from surfaces and no transmission through the laser medium are necessary. Furthermore, the use of photoluminescence or thermal radiation from the laser medium can be dispensed with.

The new process enables remote readout by spectral signature without contact with the medium.

STATE OF THE PRODUCT DEVELOPMENT

est measurements were carried out in the laboratory to obtain information on the suitability of the measurement method and its reliability. The aim of these preliminary tests was to generate initial data sets and test the evaluation algorithm in addition to extensive tests of the sensor technology. These preliminary tests with a software prototype were successfully completed. Trained neuron network models with input and output neurons and at least one internal intermediate layer ("hidden layer") were used for this purpose.

COOPERATION OPPORTUNITIES

On behalf of its shareholder Justus-Liebig-Universität Giessen TransMIT GmbH is looking for cooperation partners or licensees for in Germany, Europe, US, and Asia.

A TECHNOLOGY OF

JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

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