5<sup>th</sup> International Conference on

## **Theoretical and Applied Physics**

July 02-03, 2018 | Vienna, Austria

## Problems of high-power laser radiation measurement

Shaidullin R I<sup>1,2</sup>, Ryabushkin O A<sup>1,2</sup> and Khramov I O<sup>1</sup> <sup>1</sup>Moscow Institute of Physics and Technology, Russia <sup>2</sup>Kotelnikov Institute of Radio Engineering and Electronics—RAS, Russia

Conventional approaches to the high-power laser radiation measurement are thermal and photoelectric techniques. These methods require deflection of part of laser radiation power for its energy conversion into heat or electrical current, respectively. However, application of the beam splitters leads to significant distortion of laser beams. This limits the usability of these techniques for continuous measurement during the laser operation in industrial processes. In this study, a novel technique of fiber laser power measurement is presented. We have used a sensor representing a segment of single-mode optical fiber with copper coating. When laser radiation was transmitted through the copper-coated silica fiber sensor, its small part was scattered mainly due to Rayleigh scattering and therefore absorbed by the outer layer. This led to fiber heating and hence to the electrical resistance change of its metal layer, which was measured by milliohm meter. We have experimentally demonstrated fiber laser power measurement by splicing copper-coated fiber sensor to the output fiber of the laser. Dependence between sensor temperature and transmitting optical power was obtained. Total optical power loss was less than 0.03 % of transmitting power. We have demonstrated that this technique can be applied for continuous laser power measurements during the laser industrial operation without using beam splitters and without any significant optical power reduction or beam distortion. This technique can be applied not only for fiber laser power measurement. Using optically transparent silica rods, covered by metal coating will allow direct determination of high-intensity radiation power from any laser source.

## Biography

Shaidullin R I has completed his PhD from the Institute of Radio Engineering and Electronics of RAS. He is the Senior Researcher at the Institute of Radio Engineering and Electronics of RAS and a Lecturer in Moscow Institute of Physics and Technology. He has published more than five papers in reputed journals and more than 15 abstracts at international conferences.

rs-mipt@mail.ru

Notes: