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INTEGRAL LIGHT BEAMS SPLITTER

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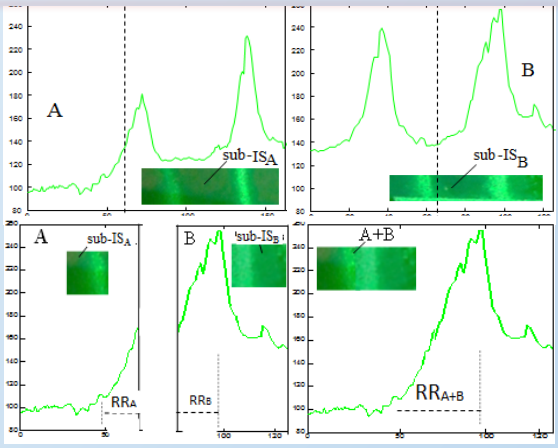
An integral beams splitter (IBS) with wedged interference structures (WIS) has been developed for smooth power-controlled spatial splitting of radiation from a single beam into separate beams or for multiplexing of spatially separated beams into a single beam has been developed at the Technical University of Sofia, for which a patent has been issued in Bulgaria.

Application № 113233



Devices for spatial separation of a light beam into separate beams based on polarization management or fiber-optic separation, absorbing filters, interferometric-type structures and variants of Fabry-Perot interferometers, single-angle WISs have disadvantages such as low power operation of the incident beam, polarized light, high energy losses, change of direction of the resulting beams with angular rotation, influence of external electric and magnetic fields, small variation of separation, short operating range with requirement of strong beam diameter limitation, etc. The challenge is a splitter with substantially improved properties, a simplified high performance structure with wide linear smooth tunability.

Technical solution

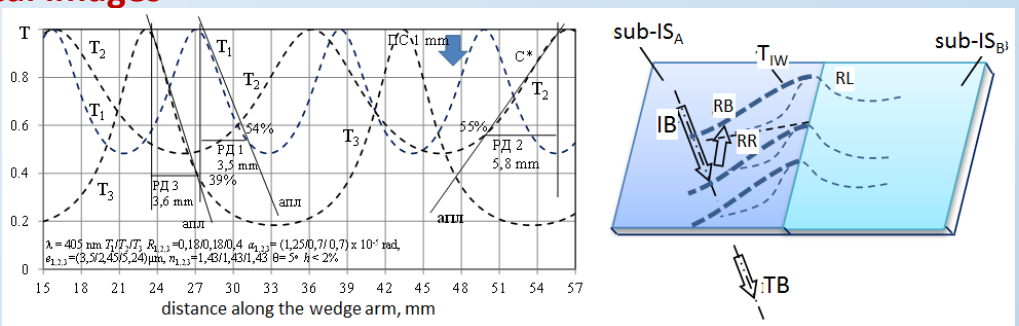
Researchers from TU-Sofia have created a planar compact IRCC element of a single incident light beam in two spatially separated beams with a smooth linearly controllable power ratio in them by linear translation of the splitter in its plane. It consists of separate integrally contacting, in-plane, interference wedged substructures or pieces thereof with appropriate parameters and mutual arrangement along a common substrate for sequential smooth sliding of the incident beam from one structure to the other as the splitter or beam slides on the surface of the wedge arm. The sub-structures are planar, each sub-structure consisting of a single or superimposed interference wedge structure, which is a single solid transparent planar dielectric wedge layer with partially reflective plane sides. The Fizeau lines are joined by tangential stacking of the selected parts of the substructures in a continuous linear sequence, to form a planar integral structure with superimposed coupled transmission drop lines in a common line, approximated by a common straight transmission line.

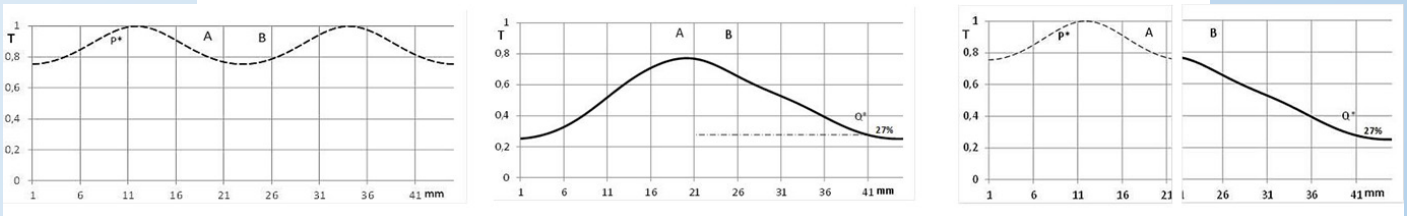
Application and advantages

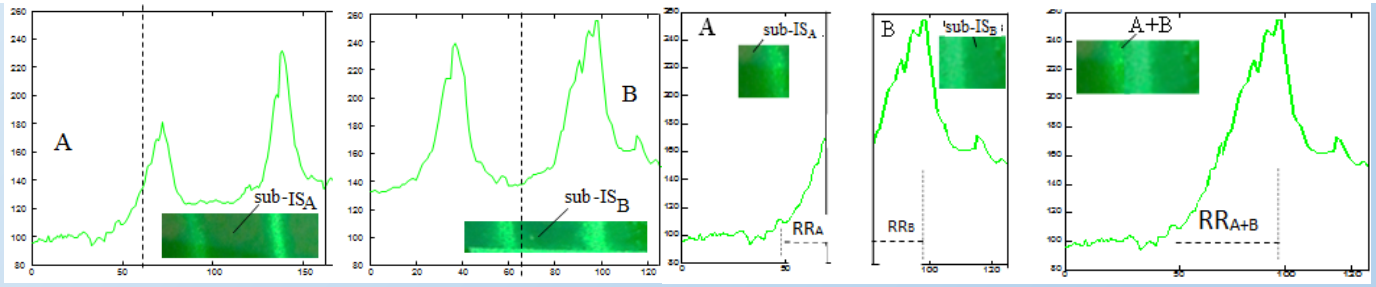
The IRCC is a compact sheet-like element with high beam-endurance, with linearly controllable, smoothly varying transmission variation between 10% and 99% of the powers and energies in the two beams, without deformation of the light intensity distribution across the cross section, with a significantly larger formed linear interval of transmission variation than that of the resonance for each composing substructure, avoiding the undesired change of the interference properties of dielectric mirrors.

For applications in optics and optical devices, in optical measurement and analysis systems, in laser technology, in research practice, in industrial optical instrumentation, optical communications, etc.

Technological images







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