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Selector of laser line of broad band tunable lasers

Inventor: S.M.Kobtsev

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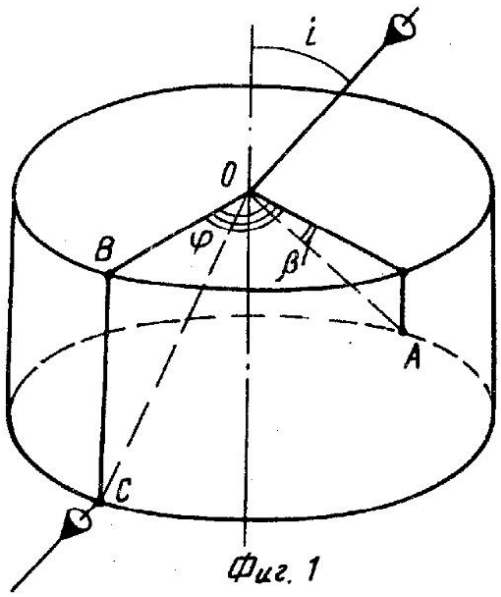
***Abstract**: selector has a plane-parallel of crystalline quartz disposed on the resonator axis at a Brewster angle and rotatable relative to the normal to the surface. The selector is characterized in that angle β between the direction on the plate optic axis and its surface within the range of 45-50 degrees provides an increased thickness of plate according to expression h:r=λ{[n2-sin2(arctg n0)]1/2- [n2-sin2(arctg n0)]1/2}-1 given in invention description, where λ is radiation wave length in the center of tuning range, n and n0 refraction indices for extraordinary and ordinary waves to the thickness of 1 mm. EFFECT: simplified manufacture, improved optic quality, enhanced stabilization of laser modes with maximum laser line width.*
3 dwg

Description

The invention relates to the field of quantum electronics and is designed to control the emission spectrum of wideband tunable lasers with a homogeneously broadened gain line such as synchronously pumped dye lasers and color center lasers or these types of passive or hybrid mode-locked soliton lasers.

The aim of the invention is to ensure the stability of mode locking laser with a maximum width of the generation line, simplifying the manufacturing process selector.

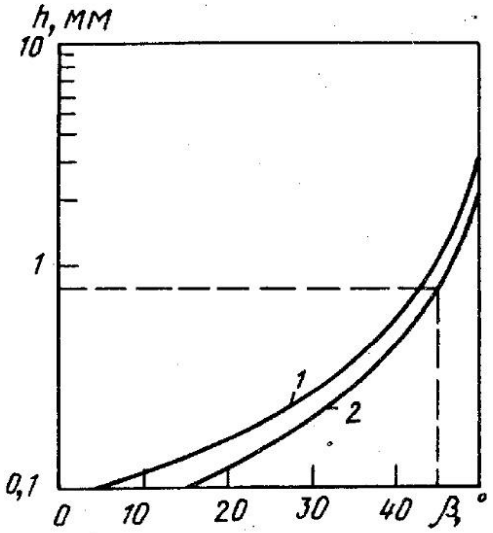
The invention consists in a selection of orientation of the optical axis of the selector and its thickness, which would provide isolation generation line via the transmission maximum of the first order with relatively high thickness of the plate.



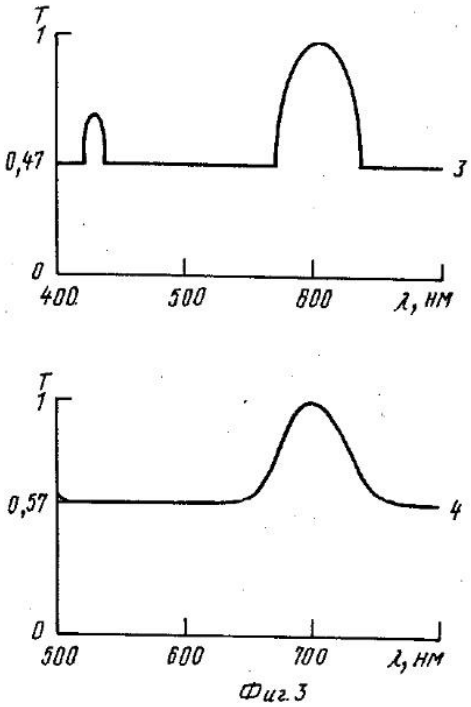
Фиг. 1

FIG. 1 shows the geometry of the birefringent plate; FIG. 2 - Depending on the thickness of the single-wave phase plate from uglaβ for radiation with a wavelength of 800 nm (curve 1) and 600 nm (curve 2); FIG. 3 - spectral transmission function of the proposed selector in the center of the operating range adjustment (curve 3) and on the boundary (line 4).

OA - optic axis of a crystal, OS - the refracted ray, ϕ- angle between the plane of incidence of the light and the projection of the SMF optical axis on the surface of the plate, i - the angle of incidence of light. Changing ugolβ you can control the difference in the refractive indices of the ordinary and extraordinary waves. When the plate thickness h, equal to h = λ {[n2- sin2 (arctg no)] 1 / 2- [no2-sin2 (arctg no)] 1/2} - 1, λ- where the wavelength of the radiation in the center of the operating range adjustment ; n, no- principal values of the refractive indices of the extraordinary and ordinary waves in crystalline quartz to radiation with a wavelength λ, it is possible to work on the first selector maximum bandwidth. At the same time on the working length volnyλo phase difference between ordinary and extraordinary waves at the output of the selector is 2π and the transmitted wave has the same polarization as the incident. Turning selector (changing λ_0) by turning of the plate relative to the surface normal.



Фиг. 2



Фиг. 3

At angles β = 43-50^0 thickness of one-wave plate of 0.6-2.1 mm for light with a wavelength of 600 nm, and 0.8-2.6 mm for light with a wavelength of 800 nm. The plates with the orientation of the optical axis

at uglomβ range of 50^0 <β <63^0 lose its efficiency due to the influence of natural optical activity in the rotation of the plane of polarization of the incident light. If β> 63^0 single-wave plate thickness is less than 0.45 nm for light with wavelength of 600 nm. Relatively large thickness plate simplifies the manufacturing process proposed by the selector. Because of the relatively large angular dispersion ≈20 nm / deg contrast transmission function selector proposed changes slightly when turning a broadband spectral position of the maximum bandwidth, which is also advantage of the device (Fig. 3). Large plate thickness also helps to improve the optical quality of the selector. (56) Technical description of the group laser devices company "Coherent Radiation" TDC. M. Translation N B-30302, 1979.
Mitschke E., Mollenauer L. Stabilizing the soliton laser. IEEE, J. of Quant Electr. , 1986, v. QE-22, N 12, p. 2242-2250.

Claims (1)

1: Birefringent line selector generation of broadband tunable laser, which is a plane-parallel plate of quartz crystal, characterized in that, in order to ensure stability of the mode locking laser with a maximum width of the generation line and in order to simplify the manufacturing process of the selector, the angle β between the direction of the optical axis of the plate and its surface has a value in the range 43 - 50^0, and the plate thickness h has a value of $h = \lambda \{[n^2-\sin^2(\text{arctg } n_0)] 1 / 2- [n20-\sin^2 (\text{arctg } n_0)] 1/2\} -1$ where λ - length wave radiation in the center of the operating range of adjustment; n, n_0 - the refractive indices of the extraordinary and ordinary waves of crystalline quartz to radiation with a wavelength λ.