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FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OH
S V KULAKOV ET AL 15 NOV 85 FTD-ID(RS)-T-1568-84

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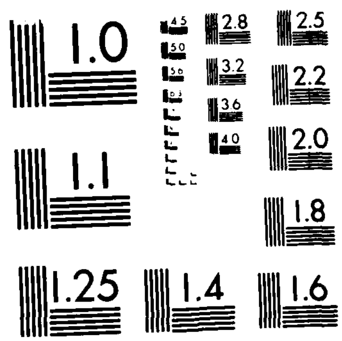

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FOREIGN TECHNOLOGY DIVISION

AN OPTICOACOUSTIC CORRELATION SPECTRAL ANALYZER

by

S.V. Kulakov, B.P. Razzhivin, et al.

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EDITED TRANSLATION

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By: S.V. Kulakov, B.P. Razzhivin, et al.

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

AN OPTICOACOUSTIC CORRELATION SPECTRAL ANALYZER

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The invention concerns the field of radioengineering and is designed for the analysis of radio signal spectra.

An opticoacoustic correlation spectral analyzer is known, containing a mixer, a band filter, a radio pulse generator and an indicator.

The aim of the invention is to increase the product of the analysis band width times the analysis time and to speed up the analysis process.

This is achieved by the fact that an opticoacoustic correlator with two ultrasonic light modulators is introduced into the analyzer, in which ultrasonic waves propagate in opposite directions. One of the modulators is connected to the output of the band filter, the other to the output of the radio pulse generator.

The drawing shows a functional diagram of the opticoacoustic correlation spectral analyzer.

The spectral analyzer consists of a mixer 1, radio pulse generators 2,3 with linear frequency modulation, a band filter 4, an indicator 5 (oscillograph), an opticoacoustic correlator, consisting of a source of coherent light 6 (laser), condenser 7, collimating lens 8, ultrasonic light modulators 9 and 10, an integrating lens 11 (objective) and a photoelectronic multiplier 12.

The signal being analyzed is applied to the input 13 of the mixer 1 and starts the generators 2,3 and the sweep of the indicator 5. The generator 2 forms a radiopulse with linear frequency modulation, the length of which is equal or larger than that of the signal being analyzed, while the frequency deviation is equal or larger than the spectral width of the signal being analyzed. The radio pulse is sent to the second input of the mixer.

The signal formed by the mixer 1 is sent to the band filter 4. From the output of the filter 4 all time-coinciding radio pulses with linear frequency modulation differing in central frequencies are removed. Each such radio pulse corresponds to one spectral component of the signal being analyzed.

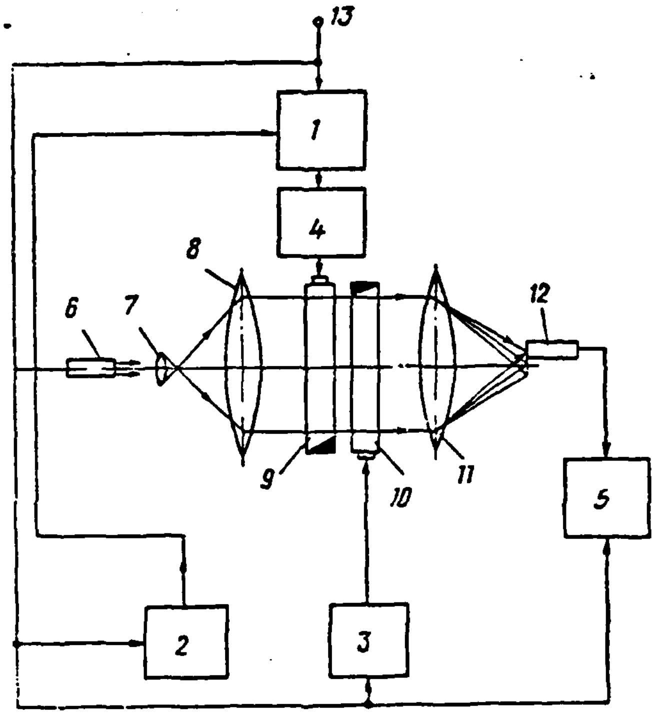
Thus the collection of radio pulses from the output of the filter 4 has a spectrum with a width approximately twice as large as the width of the spectrum being analyzed. This collection of radio pulses is sent to the modulator 9. The generator 3 forms a radio pulse with linear frequency modulation. Its length and frequency deviation are twice as large as the length and frequency deviation of the radio pulse put out by generator 2. This radio pulse is sent to the modulator 10.

The parameters of the signals sent to modulators 9 and 10 should be such that their central frequencies coincide, while they have opposite laws of frequency variation. A plane light wave formed by the source 6, condenser 7 and collimator 8 illuminates the modulators 9 and 10. As the light passes through the modulators 9 and 10, the signals are multiplied. Each radio pulse with linear frequency modulation propagating in modulator 9 and corresponding to a certain spectral component of the signal being analyzed forms a mutual correlation function with a certain part of the signal propagating in modulator 10. Therefore the output signals corresponding to the spectral components of the signal being analyzed are shifted in time. The opposite propagation of the ultrasonic wave packets provides the necessary signal shift to produce the correlation function. The lens 11 performs an integration, while the photoelectric multiplier 12 converts the light flux into an electric signal, observed on the screen of the indicator 5.

The envelope of the output signal of the device corresponds to the modulus of the spectral density of the signal being analyzed. The opposite propagation of ultrasonic waves in modulators 9 and 10 reduces the time needed to produce the signal corresponding to the spectral density of the signal being analyzed. The use of wideband ultrasonic light modulators using higher radio frequencies (up to several hundred megahertz) substantially increases the product of the analysis band width times the analysis time.

Patent Claims

An opticoacoustic correlation spectral analyzer, containing a mixer, a band filter, a radio pulse generator, an indicator, distinguished by the fact that, to increase the product of the analysis band width times the analysis time and speed up the analysis process, there is introduced an opticoacoustic correlator with two ultrasonic light modulators, in which the ultrasonic waves propagate in opposite directions, one of the modulators being connected to the output of the band filter, the other to the output of the radio pulse generator.



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