Identification of Wave Regularities According to Statistical Data of Parameters of 24 Pulsars

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Abstract

The method of identification is shown on the example of tabular these measurements of six parameters at 24 pulsars. The equations of a trend and oscillatory indignations on the basis of steady laws on the generalized wave function in the form of an asymmetric wavelet signal with variables of amplitude and the period of fluctuation are received. On the remains it is possible to receive a set of microfluctuations and to bring identification to an error of measurements. Schedules of components of the generalized model of a wavelet signal allow to see visually a picture of mutual influence of all six parameters of pulsars. On the revealed equations it is possible to carry out the amplitude-frequency analysis. Quality of basic data is estimated by rank distributions of values of parameters of pulsars. Thus ranging of values of parameters on a preference preorder vector "better→worse" is carried out in the beginning, the rating of pulsars is formed further.

Introduction

Unlike deductive approach to wavelet analysis proceeding from the equations of classical mathematics inductive approach when statistical selection is primary is offered and concerning it the structure and values of parameters of the generalized wave function [1-17] is identified. Any phenomenon (time cut) or process (change in time) according to sound tabular statistical quantitative data (a numerical field) inductively can be identified the sum of asymmetric wavelet signals of a look:

$$y = \sum_{i=1}^{m} y_i, y_i = A_i \cos(\pi x / pi - a_{8i}) \qquad (1)$$

$$A_i = a_{1i} x^{a_{2i}} \exp(-a_{3i} x^{a_{4i}}), \quad p_i = a_{5i} + a_{6i} x^{a_{7i}}$$

Where y - indicator (dependent variable), i - number of the making statistical model (1), m - the number of members of model depending on achievement of the remains from (1) error of measurements, x - explanatory variable, A_i-amplitude (half) of fluctuation (ordinate), pi - half-cycle of fluctuation (abscissa), $a_1...a_8$ - the parameters of model (1) determined in the program environment On a formula (1) with two fundamental physical constants e (Napier's number or number of time) and π (Archimedes's number or number of space) the quantized wavelet signal is formed from within the studied phenomenon and/or process.

Basic Data for Statistical Modeling

The pulsars found in the Einstein @Home project are given in article [18]. The data selected for statistical modeling are provided in Table 1. In Table 1 symbols with preference vectors are accepted: P: spin periods; P Epochepochal period of spin; DM: Dispersion Measure; S1400: Flux Densities; D: Estimated Distance; S: Significance are given for reproducibility reasons.

In total from data [18] it was succeeded to allocate six factors having quantitative values. On them it is possible to assume that amplitude and the period of fluctuations on the general model (1) submit to the biotechnical law [2-5]. In the beginning we will consider rank distributions of values of each factor on a vector of preference and we will determine a rating of pulsars by the sum of ranks, and then we will carry out the factorial analysis of all $6^2 - 6 = 30$ binary relations.

Rank Distributions of Values of Factors

Any factors have an accurate vector orientation. The person understands an orientation of changes therefore only two options of a vector of preference are possible:

PSR	P (s)	P Epoch (MJD)	DM(pc cm⁻³)	S1400 (mJy)	D (kpc)	S
J0811-38	0.482594	50824.5	336.2	0.3	6.2	15.6
J1227-6208b	0.03453	51034.1	363.2	0.8	8.4	17.9
J1305-66	0.197276	51559.7	316.1	0.2	7.5	15.5
J1322-62	1.044851	50591.6	733.6	0.3	13.2	23.1
J1637-46	0.493091	50842.9	660.4	0.7	7	17.2
J1644-44	0.173911	51030.2	535.1	0.4	6.2	14.1
J1644-46	0.250941	50839	405.8	0.8	4.8	13.2
J1652-48b	0.003785	51373.3	187.8	2.7	3.3	22.3
J1726-31b	0.12347	51026.4	264.4	0.4	4.1	15.9
J1748-3009b	0.009684	51495.1	420.2	1.4	5	18
J1750-2536b	0.034749	50593.8	178.4	0.4	3.2	15.9
J1755-33	0.959466	52080.6	266.5	0.2	5.7	21.2
J1804-28	1.273011	51973.7	203.5	0.4	4.2	13.2
J1811-1049+	2.623859	55983.5	253.3	0.3	5.5	29.2
J1817-1938+	2.046838	55991.8	519.6	0.1	8.6	16.9
J1821-0331+	0.902316	55980.9	171.5	0.2	4.3	28.3
J1838-01	0.183295	51869.1	320.4	0.3	6.9	16.7
J1838-1849+	0.488242	55991.9	169.9	0.4	4.5	31.7
J1840-0643+	0.035578	55930	500	1.2	6.8	18.2
J1858-0736	0.551059	56108.5	194	0.3	5	16.7

Table 1: Parameters of 24 pulsars.

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a) Better it is less (yes better, the symbol ↓ on a vector "better→worse");

б) Better it is more (and it is good, therefore in the Table 2 a symbol ↑).

In function=RANG(P1;P$1:P$24;1) for the first indicator P in the program Excel environment the following symbols are accepted: P1: identifier of a column and the first line; P$1: the first line of the ranged column; P$24: the last line of the ranged column according to the Table 1; 0∨1: ranging on decrease (0) or to increase (1).

Ranks change from zero therefore it is necessary from results of ranging in the program Excel environment to subtract unit can be clearly understood from Table 2 and Figure 1.

The interrelation of a factor from most on rank distribution proves to be good quality or quality of basic data and it serves for check of their reliability.

The analysis of good quality of basic data is made on coefficient of correlation r of the equation

$y = f$ $(R=0,1,2,3,...)$ of rank distribution of a factor on the general formula

$$Y = Y_0 \exp(\pm aR^b) \quad ()$$

where Y - the ranged parameter, Y0- initial value of parameter, a - activity of exponential growth or death of values of parameter; b - intensity of growth or recession.

Parametrical identification [8-10,12,18] of formulas (1) received the equations:

$$S1400 = 2.70997 \exp\left(-0.49867 R_{S1400}^{0.59345}\right), r = 0.9918 \quad (2)$$

$$D = 13.00645 \exp\left(-0.32575 R_{D}^{0.43075}\right), r = 0.9887 \quad (3)$$

$$DM = 134.86273 \exp\left(0.052517 R_{DM}^{1.09651}\right), r = 0.9875 \quad (4)$$

$$S = 36.27767 \exp(-0.14785 R_{P}^{1.53169}), r = 0.9829 \quad (5)$$

$$P = 0.10117 \exp(0.026123 R_{P}^{1.53169}), r = 0.9804 \quad (6)$$

$$P_{Epoch} = 49452.9768 \exp(0.0050522 R_{PEpoch}), r = 0.8697 \quad (7)$$

On decrease of coefficient of correlation a rating of factors on quality of measurements the following: 1: S1400; 2: D; 3: DM; 4: S; 5: P and 6: P Spoch. Thus it appeared that it is convenient to use ranks instead of factors as remove a mathematical problem of "curse of dimensionality", for example, at a rating on a set of diverse indicators.

Rating of Pulsars

The general vector of heuristic preference "better→worse" leads all considered factors to one "denominator" that allows to estimate the sum of ranks (Table 3), even without mathematical justification, ratings of subjects and objects (in our example among 24 pulsars).

From data of Table 3 it is visible that on the first place on an indicator I there is J1227- 6208b pulsar, on the second - J1652-48b and on the third J1748-3009b. And among the factors for the indicator IF on the first place is a factor in S1400, the second S and in third place D. And the three factors P, P Epoch and DM took fourth place. The rating of pulsars (Figure 2) changes under the law of exponential growth

$$\Sigma R = 44.63386 \, exp(0.040564 I^{0.90632}) \quad (8)$$

From the remains in Figure 2 it is visible that at bigger quantity of pulsars in addition to the equation (8) also wave components on model are possible (1).

Binary Relations between Factors

From six factors of all are possible $6^2 - 6 = 30$ binary relations. Six distributions are rank. Correlation matrix, including and rank distributions, it is given in Table 4.

PSR	RP	P (s)	R_{PE}	P Epoch (MJD)	R_{DM}	DM (pc cm⁻³)	R_{S1400}	S1400 (mJy	R_{D}	D (kpc)	R_{S}	S
J0811-38	12	0.482594	2	50824.5	14	336.2	14	0.3	8	6.2	17	15.6
J1227-6208b	2	0.03453	9	51034.1	15	363.2	4	0.8	2	8.4	10	17.9
J1305-66	9	0.197276	12	51559.7	12	316.1	20	0.2	3	7.5	18	15.5
J1322-62	20	1.044851	0	50591.6	23	733.6	14	0.3	0	13.2	5	23.1
J1455-59	7	0.176191	4	50841.7	18	498	1	1.6	4	7	20	14
J1601-50	16	0.860777	6	50993.6	0	59	8	0.4	21	3.6	3	29.1
J I 619-42	19	1.023152	16	51975.6	3	172	7	0.6	20	3.7	0	35.4
J1626-44	11	0.308354	13	51718.6	11	269.2	14	0.3	14	4.8	21	13.2
J1637-46	14	0.493091	5	50842.9	22	660.4	6	0.7	4	7	11	17.2
J1644-44	6	0.173911	8	51030.2	21	535.1	8	0.4	8	6.2	19	14.1
J1644-46	10	0.250941	3	50839	16	405.8	4	0.8	14	4.8	21	13.2
J1652-48b	0	0.003785	10	51373.3	5	187.8	0	2.7	22	3.3	6	22.3
J1726-31b	5	0.12347	7	51026.4	9	264.4	8	0.4	19	4.1	15	15.9
J1748-3009b	1	0.009684	11	51495.1	17	420.2	2	1.4	12	5	9	18
J1750-2536b	3	0.034749	1	50593.8	4	178.4	8	0.4	23	3.2	15	15.9
J1755-33	18	0.959466	17	52080.6	10	266.5	20	0.2	10	5.7	7	21.2
J1804-28	21	1.273011	15	51973.7	7	203.5	8	0.4	18	4.2	21	13.2
J1811-1049+	23	2.623859	20	55983.5	8	253.3	14	0.3	11	5.5	2	29.2
J I 817-1938+	22	2.046838	21	55991.8	20	519.6	23	0.1	1	8.6	12	16.9
J1821-0331+	17	0.902316	19	55980.9	2	171.5	20	0.2	17	4.3	4	28.3
J1838-01	8	0.183295	14	51869.1	13	320.4	14	0.3	6	6.9	13	16.7
J1838-1849+	13	0.488242	22	55991.9	1	169.9	8	0.4	16	4.5	1	31.7
J1840-0643+	4	0.035578	18	55930	19	500	3	1.2	7	6.8	8	18.2
J1858-0736	15	0.551059	23	56108.5	6	194	14	0.3	12	5	13	16.7

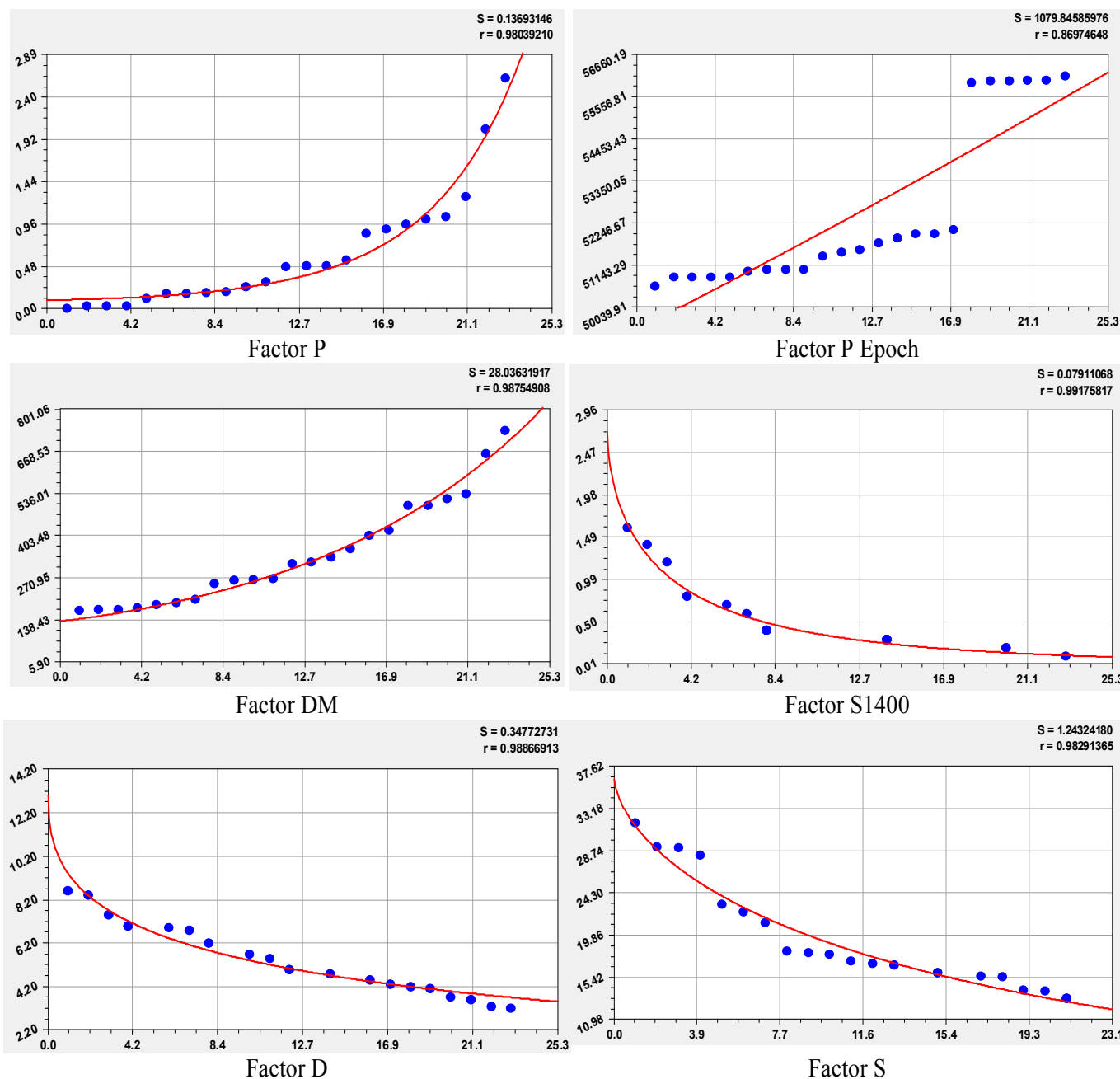**Table 2**: Rank distributions of six parameters of 24 pulsars.

Figure 1: Schedules the rank of distributions of values at six parameters of 24 pulsars.

The minimum narrowness of factorial communication is observed at the mathematical DM=f(P) function, and the maximum coefficient of correlation at S1400=f(DM) ratio with the accounting of wave indignations of parameters of pulsars.

A Rating of Factors as the Influencing Variables and Indicators

From data of Table 4 it is visible that each measured factor can be considered in two roles:

First, as the influencing variable; secondly, as dependent indicator. Thus the method of the factorial analysis offered by us allows not

thinking a priori of ratios between separate parameters of the studied system (in our example system from 24 pulsars). As a result the psychological barrier at re- searchers gets off. Many binary relations for the researcher will be unexpected. Therefore as our practice showed, the factorial analysis the unique equation of type (1) allows finding unexpected solutions in the field of research. If some factorial communications are unusual and thus are highly adequate, new technical solutions, and often at the level of inventions of world novelty are shown [18]. Thus repeated identification (1) on a single binary relation we called wavelet analysis [1,6,7,11,13-17].

Without waves, that is changes only on amplitude at very long wave, incommensurably bigger on the fluctuation period to an

PSR	Ranks of values of factors						ΣR	Place *I*
	R_P	R_{PE}	R_{DM}	R_{S1400}	R_D	R_S		
J0811-38	12	2	14	14	8	17	67	13
J1227-6208[b]	2	9	15	4	2	10	42	**1**
J1305-66	9	12	12	20	3	18	74	17
J1322-62	20	0	23	14	0	5	62	9
J1455-59	7	4	18	1	4	20	54	4
J1601-50	16	6	0	8	21	3	54	4
J I 619-42	19	16	3	7	20	0	65	12
J1626-44	11	13	11	14	14	21	84	22
J1637-46	14	5	22	6	4	11	62	9
J1644-44	6	8	21	8	8	19	70	16
J1644-46	10	3	16	4	14	21	68	14
J1652-48[b]	0	10	5	0	22	6	43	**2**
J1726-31[b]	5	7	9	8	19	15	63	11
J1748-3009[b]	1	11	17	2	12	9	52	**3**
J1750-2536[b]	3	1	4	8	23	15	54	4
J1755-33	18	17	10	20	10	7	82	20
J1804-28	21	15	7	8	18	21	90	23
J1811-1049[+]	23	20	8	14	11	2	78	18
J I 817-1938[+]	22	21	20	23	1	12	99	24
J1821-0331[+]	17	19	2	20	17	4	79	19
J1838-01	8	14	13	14	6	13	68	14
J1838-1849[+]	13	22	1	8	16	1	61	8
J1840-0643[+]	4	18	19	3	7	8	59	7
J1858-0736	15	23	6	14	12	13	83	21
ΣR	276	276	276	242	272	271	1613	-
Place *I F*	4	4	4	1	3	2	-	-

Table 3: Ranks of values of six parameters and rating among 24 pulsars.

Influencing factors *x*	Dependent factors (indicators *y*)					
	P (s)	*P* Epoch (MJD)	DM (pc cm⁻³)	S1400 (mJy)	D (kpc)	S
Spin periods P (s)		0.4978	*0.0608*	0.8640	0.2688	0.4270/0.8024
P Epoch (MJD)	0.4741		0.1904	0.2097	0.0652	0.3687
Dispersion measure DM (pc cm3)	0.1039/0.6948	0.1904		0.0987/**0.9846**	0.8103/0.9169	0.6445/0.8734
Flux densities S1400 (mJy)	0.6069	0.3223	0.4914		0.2089	0.2462
Estimated distance D (kpc)	0.1602/0.7742	0.0648	0.8086	0.2188		0.4270/0.6403
Significance are given for reproducibility reasons S	0.4335	0.3951/0.9145	0.4800/0.8602	0.2455/0.8576	0.4287/0.9163	

Table 4: Correlation matrix of the binary relations between six factors of 24 pulsars.

Influencing factors *x*	Dependent factors (indicators *y*)						Sum Σr	Place *I_x*
	P (s)	*P* Epoch (MJD)	DM (pc cm⁻³)	S1400 (mJy)	D (kpc)	S		
P (s)	0.9804	0.4978	0.0608	0.8640	0.2688	0.4270	3.0988	1
P Epoch (MJD)	0.4741	0.8697	0.1904	0.2097	0.0652	0.3687	2.1778	6
DM (pc cm⁻³)	0.1039	0.1904	0.9875	0.0987	0.8103	0.6445	2.8353	4
*S*1400 (mJy)	0.6069	0.3223	0.4914	0.9918	0.2089	0.2462	2.8675	3
D (kpc)	0.1602	0.0648	0.8086	0.2188	0.9887	0.4270	2.6681	5
S	0.4335	0.3951	0.4800	0.2455	0.4287	0.9829	2.9657	2
Sum Σr	2,7590	2,3401	3,0187	2,6285	2,7706	3,0963	16,6132	-
Place of Indicator *I_y*	4	6	2	5	3	1	-	0.4615

Table 5: Rating of factors on the determined relations (trends).

interval of measurements, are formed the so-called determined binary relations. Rank distributions, as a rule, are accepted in the form of not wave steady laws [2-5,8-10,12].

The square correlation matrix received after the analysis the rank distributions and the bi- nary relations between all six variables accepted on basic data from Table 1 is given in Table 5.

Here all 36 relations are considered. Besides, summation in the lines and columns two ratings on decrease of this sum turned out: first, a rating of factors as the influencing variables; secondly, rating of factors as dependent indicators. We will define the second rating (Table 6) taking into account identification of wave indignations (1).

The coefficient of a correlative variation for 24 pulsars is equal

Indicators y	Asymmetric wavelet $y_i=a_{1i}xa^{2i}exp(-a_{3i}x^{a4i})cos(\pi x/a_{5i}+a_{6i}x^{a7i})-a^{8i}$								Correl. coeffic. r
	Amplitude (half) of fluctuation				Fluctuation half-cycle			Shift	
	a_{1i}	a_{2i}	a_{3i}	a_{4i}	a_{5i}	a_{6i}	a_{7i}	a_{8i}	
The influence P (s)									
S1400 (Figure 3)	2050.7218	0	7.92517	0.096413	0	0	0	0	0.8640
	-1598.1935	0.13364	8.27987	0.14063	0	0	0	0	
S (Figure 4)	1.53821e6	0	11.67158	0.0081309	0	0	0	0	0.8024
	-15.39225	0.42954	0	0	3.97475	-2.58176	0.34198	-1.26394	
The influence DM (pc cm^{-3})									
S1400 (Figure 5)	2.04947e-9	3.72097	0.00040479	1.41209	0	0	0	0	0.9846
	0.63017	0	-0.0010119	1	0.091922	0.060427	0.92986	-1.25936	
	-1.98879e-99	48.97221	0.011710	1.48994	11.11160	0.0027704	0.99620	-3.00858	
	1.79820e-71	30.68609	0.051046	1.00882	16.28551	0.020073	1.07326	2.77439	
D (Figure 6)	3.34608	0	-0.0015439	1	0	0	0	0	0.9169
	-2.34611e-6	2.71288	0.080460	0.59551	196.36141	-0.018607	1.24995	-3.39603	
S (Figure 7)	29.79584	0	-2.61436e-5	1.43411	0	0	0	0	0.8734
	-5.16004e-6	2.85167	0.0050163	0.99972	0	0	0	0	
	1.19274e-19	10.57480	0.050357	0.99990	91.63358	-0.13742	1.00030	0.49007	
The influence D (kpc)									
P (Figure 8)	7.26123e-6	0	-10.71388	0.045383	0	0	0	0	0.7743
	1.59048e-12	82.10764	34.41670	0.69352	1.15158	-0.0050928	2.22537	-0.54182	
DM	7.64387	5.36583	15.53911	0.19098	0	0	0	0	0.8086
The influence S									
P Epoch (Figure 9)	71154.646	0	0.041508	1	0	0	0	0	0.9145
	16.95545	2.85827	0.074222	1	0	0	0	0	
	4.36354e-97	118.48896	5.41816	1.04780	0.029084	0.020098	0.79277	4.45296	
	1.15086e-81	74.94389	1.06061	1.18174	1.62870	-0.012183	1.13631	-0.72450	
DM (Figure 10)	2.95376	2.76075	0.17533	1	0	0	0	0	0.8602
	-1.19512e-13	17.08714	0.77904	1	3.16941	-0.19665	0.61241	-1.19205	
S1400 (Figure 11)	7.88199e-6	4.31945	0.00024563	2.84411	0	0	0	0	0.8576
	-5.87618e-11	8.68372	0.0018541	2.37349	4.86794	-0.098820	0.97998	-3.36086	
D (Figure 12)	0.014339	2.62626	0.018621	1.49231	0	0	0	0	0.9163
	2.66617e-34	35.99771	1.08513	1.09501	1.19527	0.00025715	1.94603	-0.63065	
	-3.92413e8	0	10.53668	0.22211	0.056832	0.015024	1.05854	-1.52698	
	0.023354	4.22841	1.20530	0.67921	1.19570	-0.081320	0.30418	-2.16059	

Table 6: Parameters of the strong binary relations at correlation coefficient $r \geq 0.7$

Influencing factors x	Dependent factors (indicator y)						Sum Σr	Place $I\,x$
	P (s)	P Epoch (MJD)	DM (pc cm^{-3})	S1400 (mJy)	D (kpc)	S		
P (s)	0.9804	0.4978	0.0608	0.8640	0.2688	**0.8024**	3.4742	4
P Epoch (MJD)	0.4741	0.8697	0.1904	0.2097	0.0652	0.3687	2.1778	6
DM (pc cm^{-3})	**0.6948**	0.1904	0.9875	**0.9846**	**0.9169**	**0.8734**	4.6476	2
S1400 (mJy)	0.6069	0.3223	0.4914	0.9918	0.2089	0.2462	2.8675	5
D (kpc)	**0.7743**	0.0648	0.8086	0.2188	0.9887	**0.6403**	3.4955	3
S	0.4335	**0.9145**	**0.8602**	**0.8576**	**0.9163**	0.9829	4.9650	1
Sum Σr	3.9640	2.8595	3.3989	4.1265	3.3648	3.9139	21.6276	-
Place of Indicator $I\,y$	2	6	4	1	5	3	-	0.6008

Table 7: Rating of factors on the determined (trends) and the wave relations.

21.6276/62=0.6008. This criterion is applied when comparing various systems, for example, of different groups of pulsars with each other.

From six influencing variables on the first place there was S factor (and according to the Table 5 a factor P). In second place fit factor DM, and in third place - D. Among dependent indicators on the first place there is S1400 factor. On the second place is occupied by the factor P, and the third - S.

Strong Binary Relations

At correlation coefficient more than 0.7 binary relations between factors become strong (Table 7). As a rule, the concept of wave indignation of the Universe gives significant increase in adequacy of the revealed regularities on a formula (1). From 11 strong communications only two treat the determined relations.

In Tables 6-9 and in Figures 3-12 parameters of models which

Influencing factors *x*	Dependent factors (indicator *y*)					
	P (s)	*P* Epoch (MJD)	DM (pc cm⁻³)	S1400 (mJy)	*D* (kpc)	*S*
P (s)				0.8640		**0.8024**
DM (pc cm⁻³)				**0.9846**	**0.9169**	**0.8734**
D (kpc)	**0.7743**		0.8086			
S		**0.9145**	**0.8602**	**0.8576**	**0.9163**	

Table 8: Rating of factors on the determined (trends) and the wave relations.

Number i	Asymmetric wavelet $y_i=a_{1i}xa^{2i}exp(-a_{3i}x^{a4i})\cos(\pi x/a_{5i}+a_{6i}x^{a7i})-a^{8i}$								Correl. coeffic. *r*
	Amplitude (half) of fluctuation				Fluctuation half-cycle			shift	
	a_{1i}	a_{2i}	a_{3i}	a_{4i}	a_{5i}	a_{6i}	a_{7i}	a_{8i}	
1	2.04947e-9	3.72097	0.00040479	1.41209	0	0	0	0	
2	0.63017	0	-0.0010119	1	0.091922	0.060427	0.92986	-1.25936	0.9846
3	-1.98879e-99	48.97221	0.011710	1.48994	11.11160	0.0027704	0.99620	-3.00858	
4	1.79820e-71	30.68609	0.051046	1.00882	16.28551	0.020073	1.07326	2.77439	
5	2.24333e-50	38.03372	0.45820	1.00739	0.49970	0	0	1.79228	0.7520
6	1.74209e-12	6.20719	0.042832	1	0.99751	-4.47582e-8	1	0.23907	0.4587
7	-1.89081e-26	17.94744	0.20496	1.00222	3.99532	-9.33281e-7	1	0.83797	0.3678
8	8.50896e-54	24.31598	0.017622	1.22135	13.86875	-0.0083353	0.81558	-3.78088	0.6264
9	8.15332e-52	22.01510	0.043386	1	2.01821	5.58641e-9	1	-3.83885	0.6344
10	2.80946e-7	2.05017	0.0036490	1	0.99921	6.42334e-8	1	-6.70016e-6	0.1153
11	-2.38324e-28	13.09090	0.039405	1.03089	1.09087	0	0	0.60793	0.6013
12	6.00812e-8	2.65338	0.015604	0.86794	2.08923	0	0	2.00084	0.5683

Table 9: Full wavelet analysis of the binary relation of S1400=f(DM).
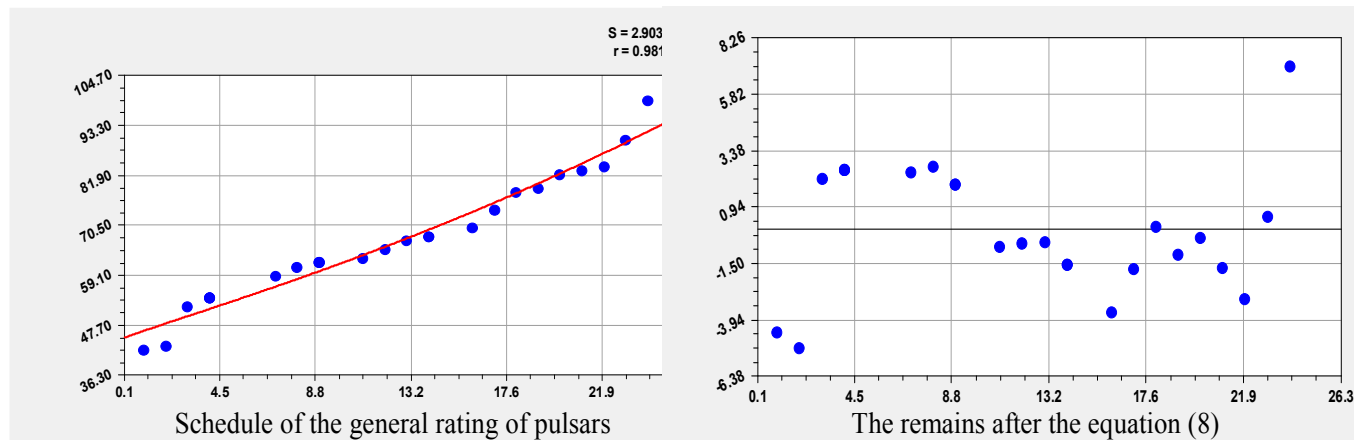
Figure 2: Schedules of rating distribution of 24 pulsars.
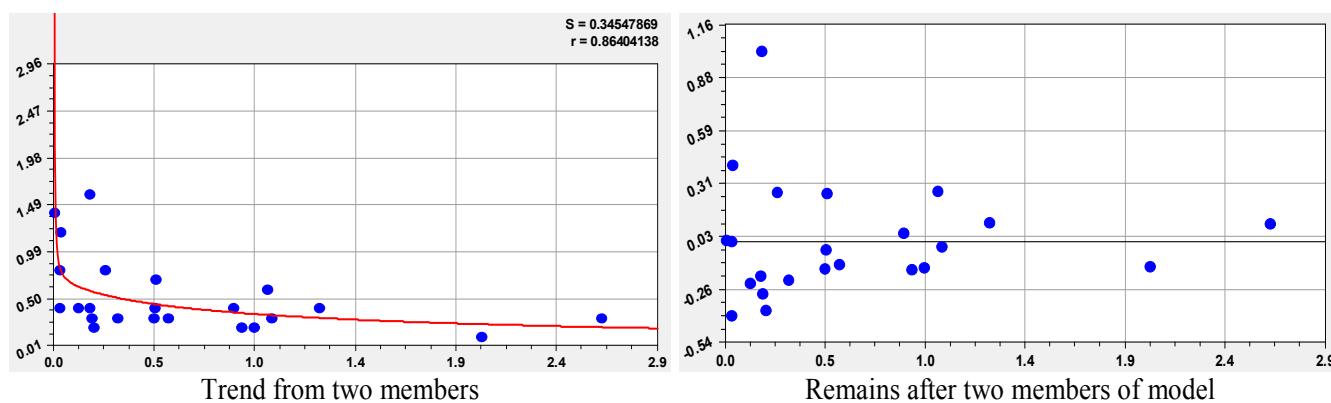
Figure 3: Schedules of models of influence of *P* (s) on change of *S*1400 (mJy).
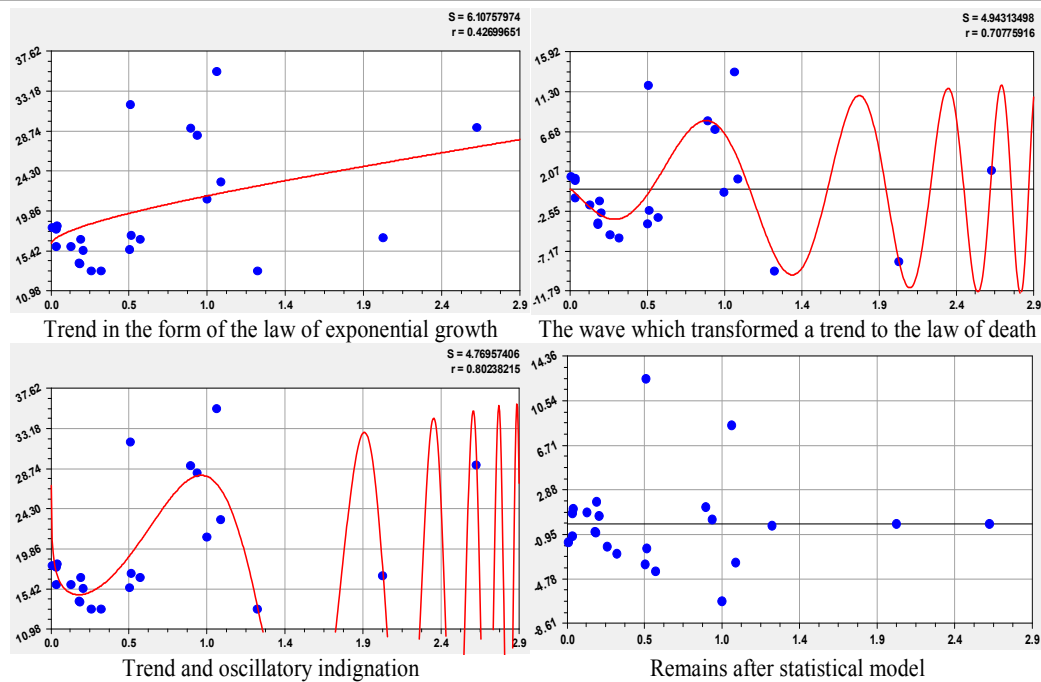
Figure 4: Schedules of models of influence of P (s) on change of S.
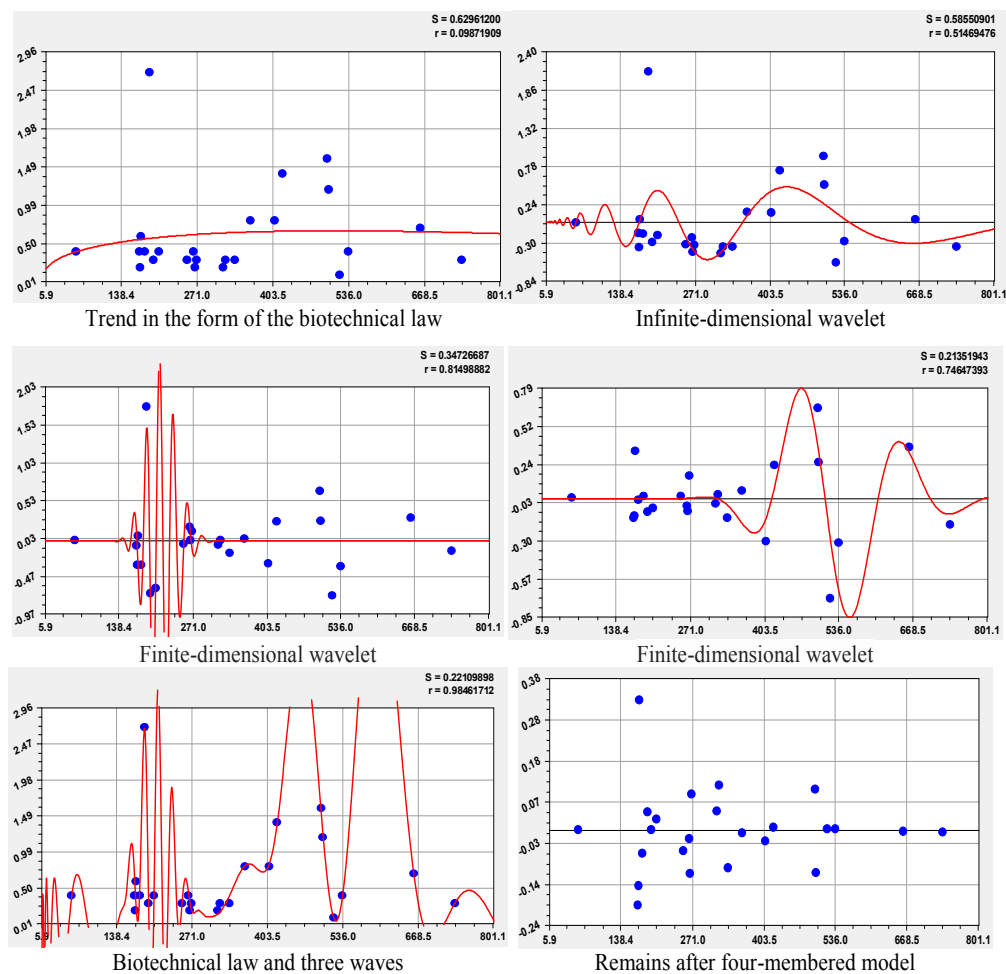
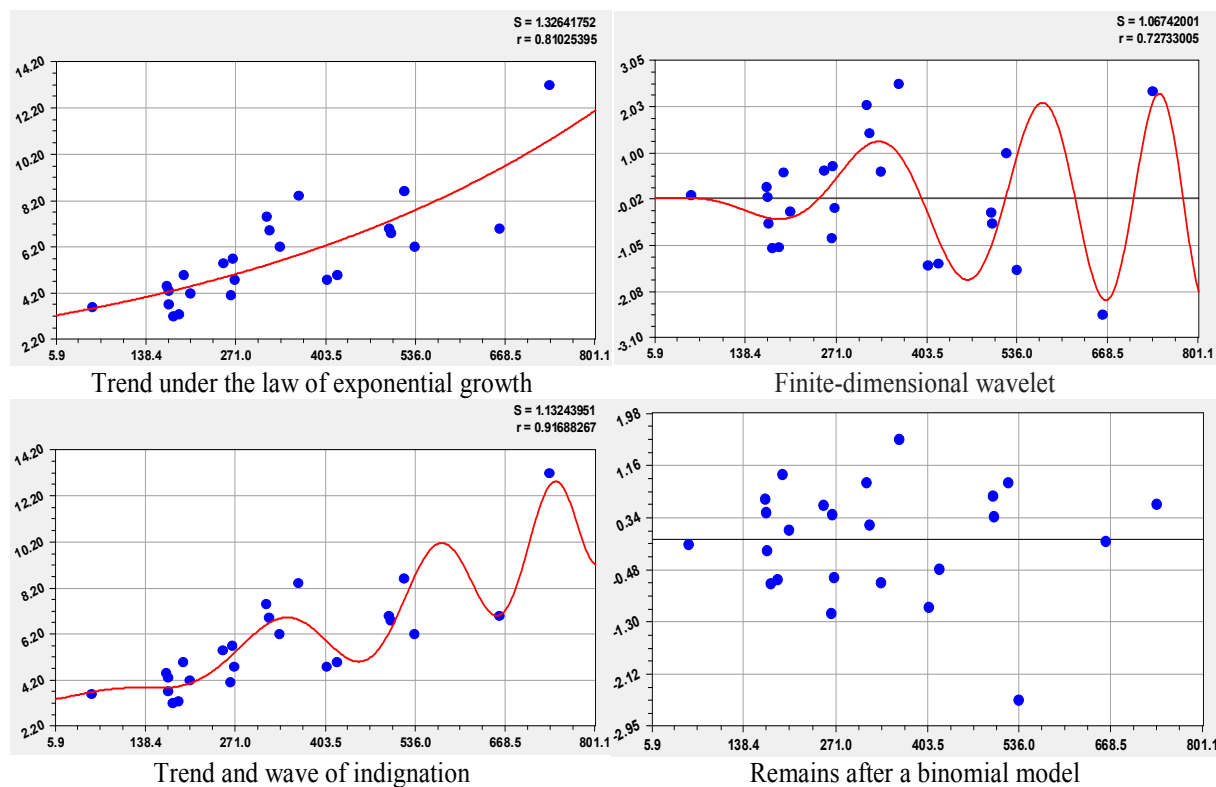Figure 5: Schedules of models of influence of DM (pc cm^{-3}) for change of $S1400$ (mJy).

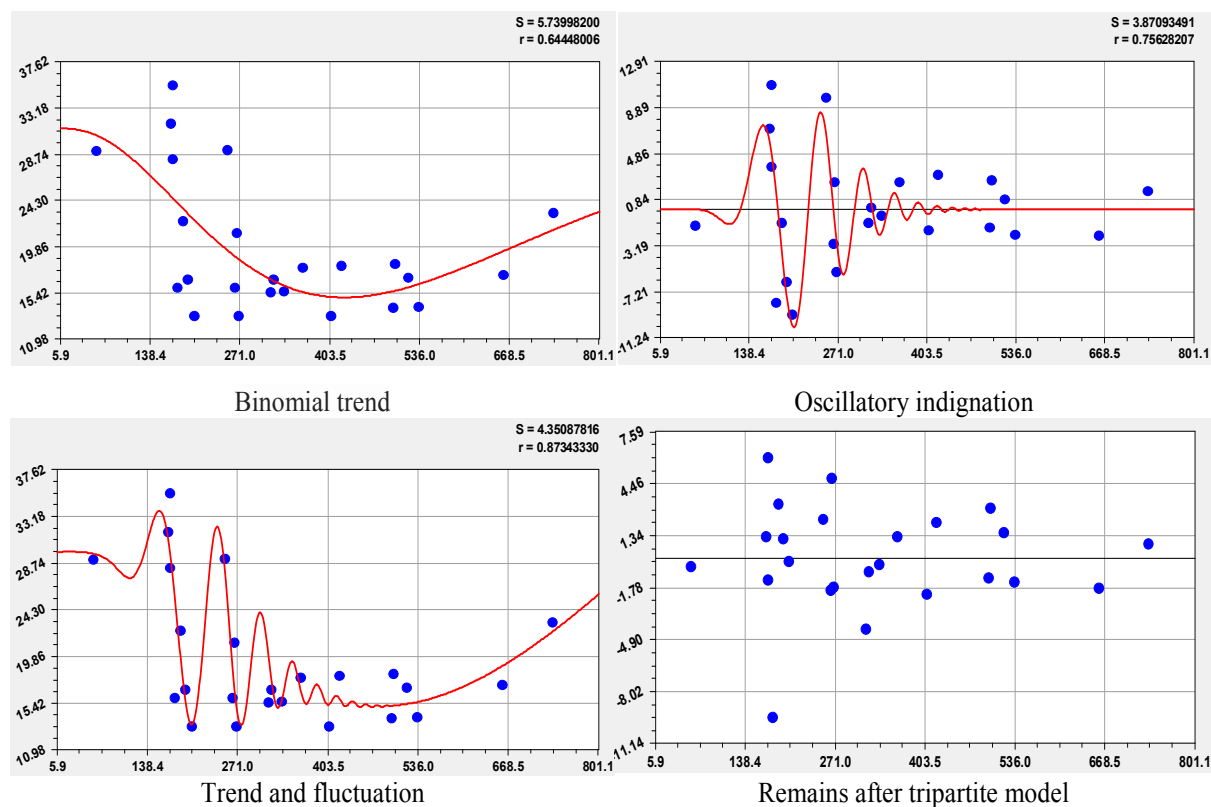**Figure 6:** Schedules of models of influence of DM (pc cm^{-3}) for change of D (kpc).

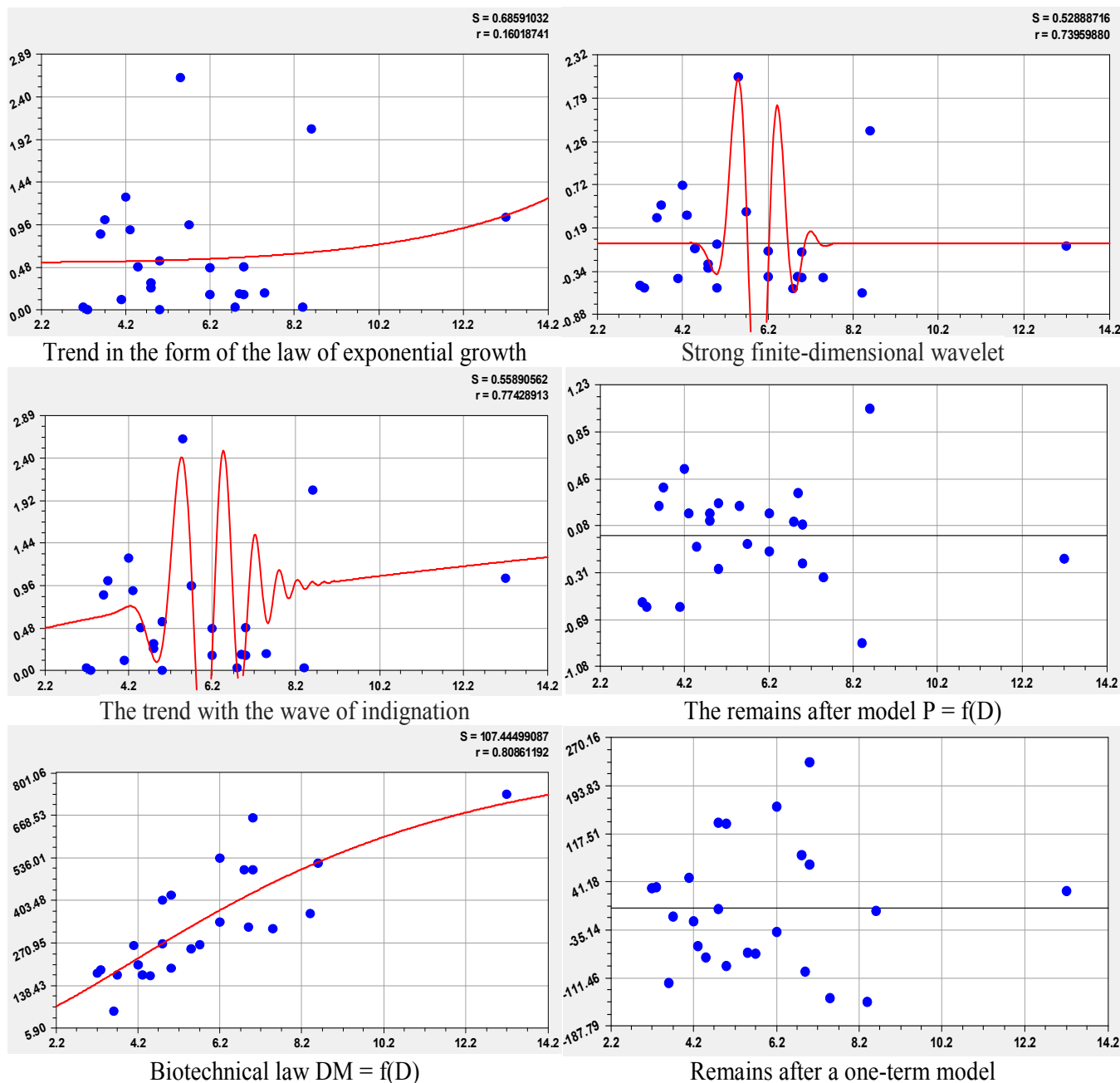**Figure 7:** Schedules of models of influence of DM (pc cm^{-3}) for change of S.

Figure 8: Schedules of models of influence of *D* (kpc) on change of *P* (s) and DM (pc cm^{-3}).

values are written down in a compact matrix form with five significant figures are given.

The maximum number of members of statistical model is equal to four that corresponds to computing opportunities of the program CurveExpert-1.40 environment. For the full wavelet analysis it is necessary to develop the special program environment according to our scenarios of statistical modeling for a supercomputer of a petaflop class. Thus the new program environment for large volumes of the table of basic data will be universal for all branches of science.

In Figure 8 influence of *D* (kpc) on change of two factors of P (s)

and DM (pc cm^{-3}) is shown. Thus change of P (s) received fluctuation in the form of a finite-dimensional wavelet.

The analysis of schedules according to amplitude-frequency characteristics shows that the system of pulsars possesses a certain property of wave adaptation.

Wavelet Analysis of Factor Relations

Consider the possibility of further identification model S1400=f(DM) with the highest adequacy 0.9846 (Table 9 and Figure 13). The price of division of a factor of S1400 according to Table 1 is
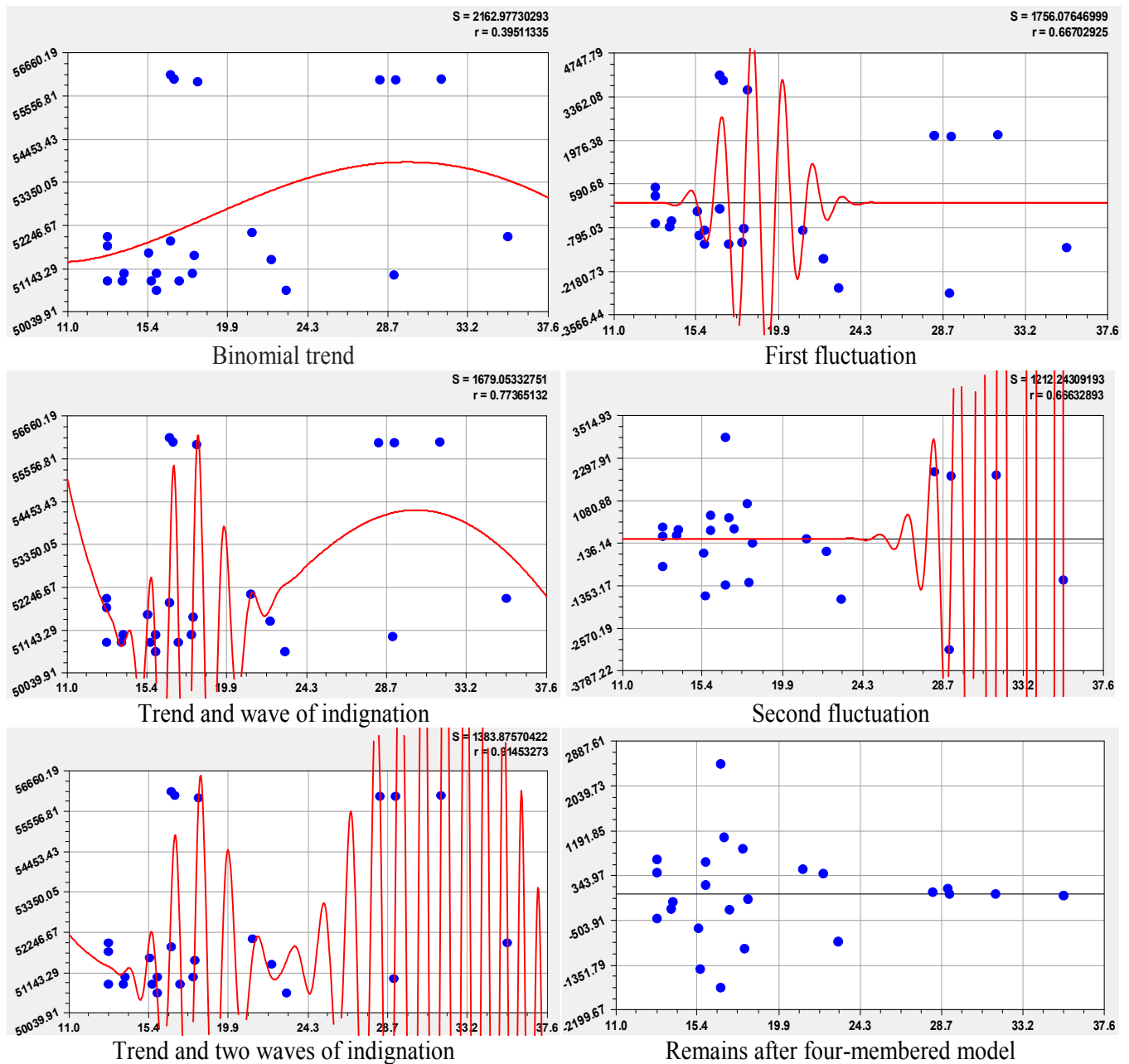
Figure 9: Schedules of models of influence of S on change of P Epoch (MJD).

equal 0.1 (mJy).Then the measurement error equal to ±0.05 (mJy), and the remainder by point graphics in Figure 13 become smaller this error. The identification process is stopped, wherein the wavelet analysis is completed. Apparently from the schedule of four-membered model in Figure 13, influence of a factor of DM for a factor of S1400 gives three clusters (a plot on abscissa axis):

1) Initial site of DM=0-130 (pc cm⁻³)

1) Initial site of DM=0-130 (pc cm^{-3})

2) Average site of DM=130-300 (pc cm^{-3})

3) Extreme site of DM=300-800 (pc cm^{-3}).

At each of the sites on the abscissa is finite wavelet signal.

For some binary relations the number of members in the general statistical model can exceed 100-120 pieces. In this case there is a possibility of carrying out the fractal analysis for group of wavelets on mega, macro, meso and to micro fluctuations.

Conclusion

Applicability of statistical model (1) to parameters of pulsars is proved. As a result each binary relation contains a trend and wavelet signals. Moreover, the trend is a special case of very long period oscillations of the wavelet. As a result the general statistical model represents the plait consisting of a set of lonely waves with variables amplitude and the period of fluctuations.
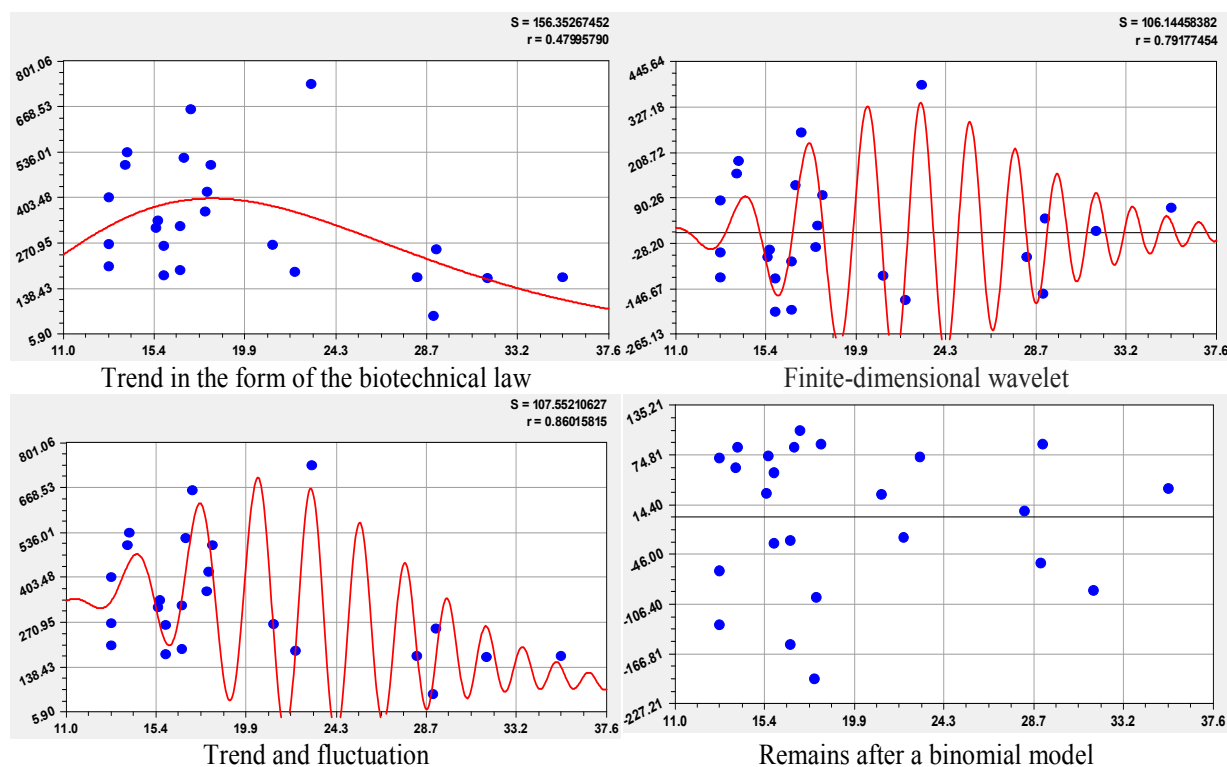
Figure 10: Schedules of models of influence of S on change of DM (pc cm^{-3}).
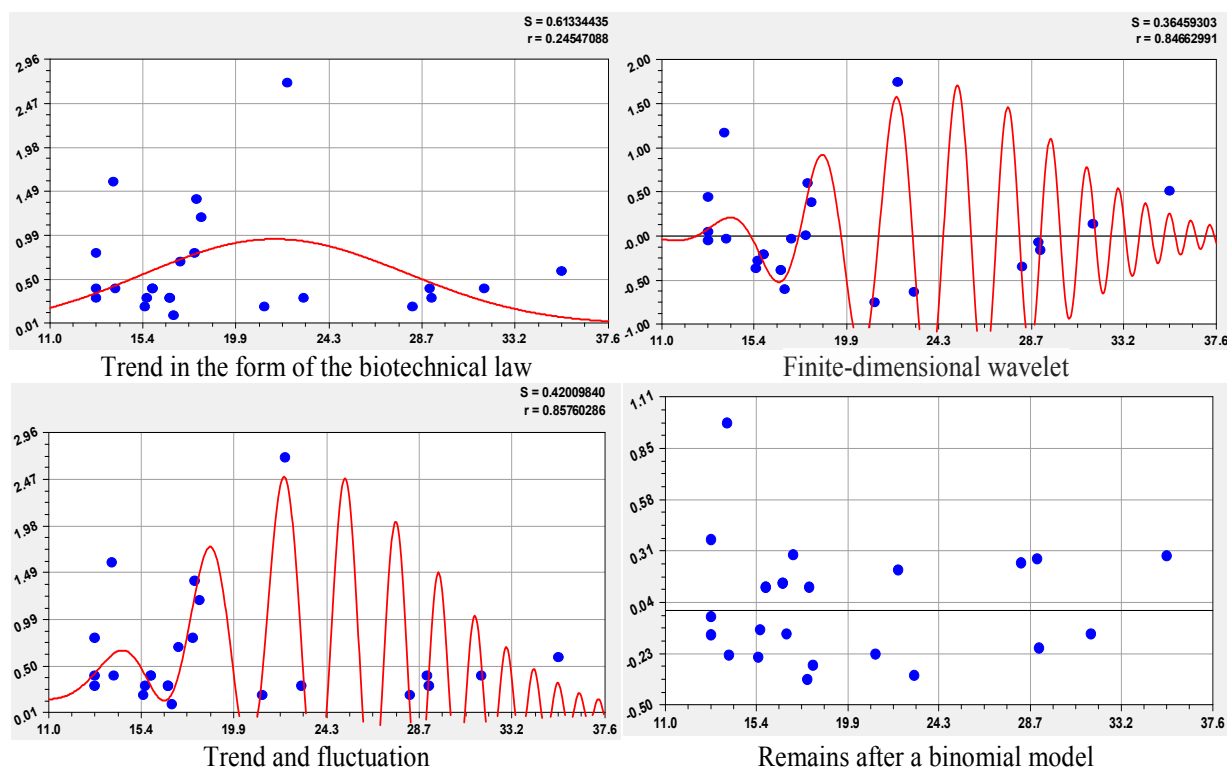
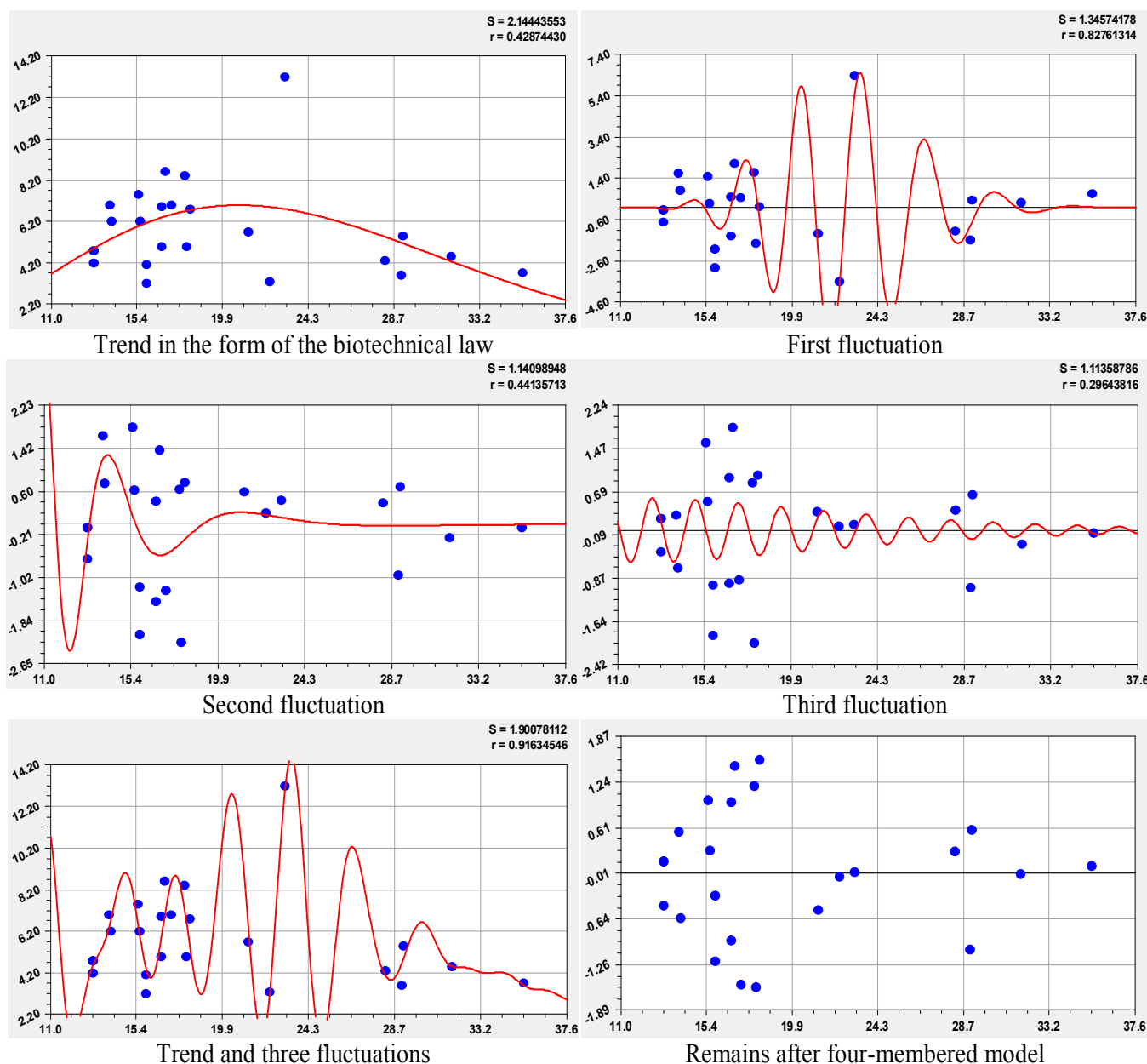**Figure 11:** Schedules of models of influence of S on change of S1400 (mJy).

Figure 12: Schedules of models of influence of *S* on change of *D* (kpc).

Quality control input data can be estimated rank distribution of values of parameters of pulsars and the ability to detect the wave patterns of reporting to the design of the same wavelet signal (1). Thus without modeling, only due to ordering of values of parameters on a preference preorder vector "better→worse", it is possible to make a rating of pulsars.

After statistical modeling carried out factor analysis which allows to make the ratings of factors as influencing parameters and how dependent indicators. For strong factorial relations additionally conducted a wavelet analysis, in which re- identification patterns (1)

to ascertain residues below the error of measurement of parameters of pulsars. This set of wavelet signals can then be subjected to fractal analysis.

The offered methodology of identification allows to allocate waves of the binary relations between the measured factors. Thus for 24 pulsars characterized by nit dimensional wavelets, which can then be compared with the heuristic views of specialists. The method of identification allows to allocate the most significant parameters and the binary relations between them at pulsars on which it will be necessary to increase the accuracy of future measurements.
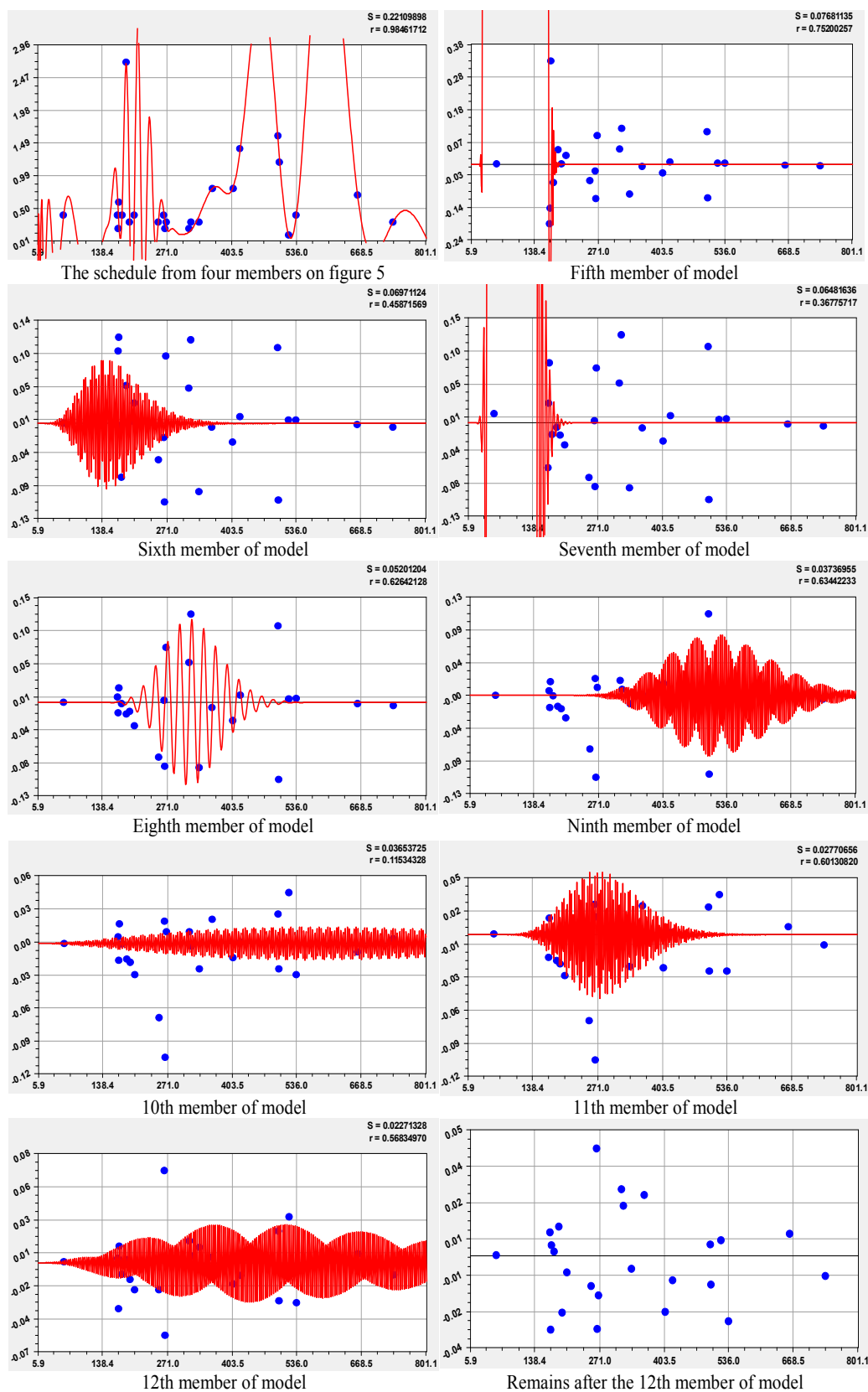
Figure 13: Schedules of influence of DM (pc cm^{-3}) for change of $S1400$ (mJy), additional to Figure 5.

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