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UFOModeler.

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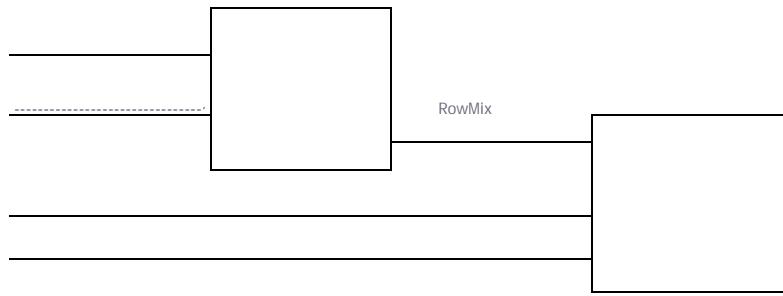
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**Reznikov N.G.¹
Zhikharev A.G.¹****APPLICATION OF THE SYSTEM-OBJECT APPROACH TO SIMULATION
OF THE CONVERSION OF RAW MATERIALS INTO
A PORTLANDCEMENT CLINKER**¹⁾ Belgorod State National Research University, 85 Pobedy St., Belgorod, 308015, Russia²⁾ Belgorod state technological university named after V.G. Shukhov, 46 Kostyukova street, Belgorod, 308012,
Russian Federation*e-mail: reznikov_n@bsu.edu.ru; zhikharev@bsu.edu.ru***Abstract**

The article discusses the construction of a simulation model of the abstract process of converting raw materials into Portland cement clinker in the UFOModeler simulation environment. An algorithm for generating a pseudo-random oxide (chemical) composition of components based on experimental data of real production and calculation for two-component and three-component raw mixtures has been developed. An algorithm for calculating the main indicators of the composition of clinker based on. The analysis of the obtained results is carried out.

Keywords: raw mix, clinker, chemical composition, mineralogical composition, chemical composition generation algorithm, simulation model, system-object approach.

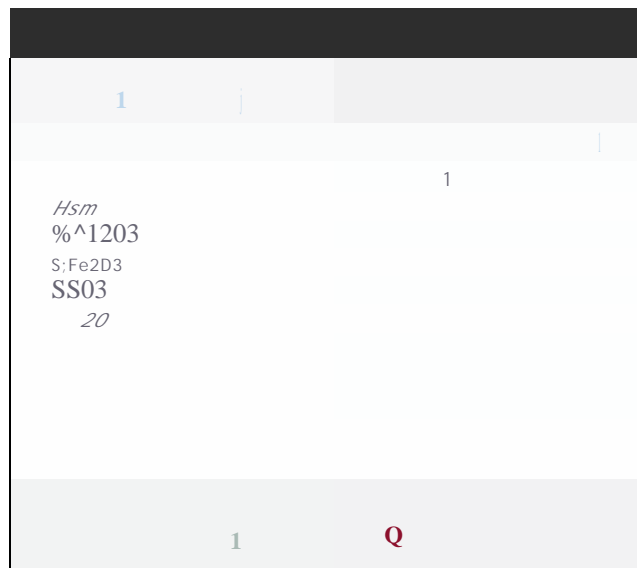
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. 1.

Fig. 1. Graphic-analytical model of conversion of raw materials into clinker

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. 2.

Fig. 2. Input link parameters

(SiO₂), (Al₂O₃) (Fe₂O₃), (CaO),
 (n) (p) , (),
 [5].

, %

Table

Chemical composition of raw materials, %

/	-		SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	SO ₃	Na ₂ O	K ₂ O
1	1	4G,75	3,38	G,86	2,58	51,9G	G,34	0,08	0,02	0,09
2	2	43,2G	G,42	G,25	G,24	55,4	G,45	0,04	G	G
3	3	43,85	G,18	G,13	G,17	55,4	G,26	0,01	G	G
4	1	11,67	55,28	12,57	5,59	8,77	1,62	G,42	1,13	2,1G
5	2	11,23	51,7	14,4	5,21	9,72	3,32	G,23	G,84	2,27
6	3	12,85	48,6	13,1	5,37	12,2	3,34	0,20	G,77	2,28
7	1	4,67	36,38	9,23	8,1G	33,21	5,G5	1,14	G,32	G,43
8	2	1,4G	38,G5	9,83	1,22	42,89	4,G1	1,18	G,29	G,51
9	3	G,48	38,4	9,13	G,62	44,4	4,34	1,G4	0,30	G,46
1G	1	2,54	22,56	3,97	27,56	25,22	9,95	G,44	G,13	0,08
11	2	-	22,48	3,93	18,49	35,46	11,58	G,42	0,03	0,06
12	3	-	2G,1	6,72	12,7	32,6	18,8	G,17	G	G

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SetLinkIn('      .%CaO', (random(18)+40+(random(100)/100)));
IsCaO:= GetLinkInF('      .%CaO');
SetLinkIn('      .%SiO2', (random(4)+(random(1GG)/1GG)));
IsSiO2:= GetLinkInF('      .%SiO2');
SetLinkIn('      .%Fe2O3', (random(3)+(random(100)/100)));
IsFe2O3:= GetLinkInF('      .%Fe2O3');
SetLinkIn('      .%Al2O3', (random(2)+(random(100)/1G0)));
IsAl2O3:= GetLinkInF('      .%Al2O3');

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% 100%, ,

100%:

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IsSum:= IsCaO+IsSiO2+IsAl2O3+IsFe2O3+IsSO3+IsR2O+IsPPP+IsMgO;
if (IsSumO1GG) then
begin
IsCaO:=100*IsCaO/IsSum;
IsSiO2:=100*IsSiO2/IsSum;
IsFe2O3:=100*IsFe2O3/IsSum;
IsAl2O3:=100*IsAl2O3/IsSum;

```

() (, ,)

[5].

n.

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SetLinkOut('      .%C3S', (4.07*drCaO-7.6*clrSiO2-6.72*clrAl2O3-
-1.42*clrFe2O3));
clrCaO:= GetLinkOutF('      .%C3S');
SetLinkOut('      .%C2S', (8.6*drSiO2+5.07*drAl2O3+1.07*clrFe2O3-
-3.67*clrCaO));
clrCaO := GetLinkOutF ('      .%C2S');
SetLinkOut('      .%C3A', (2.65*clrAl2O3-1.7*clrFe2O3));
clrCaO:= GetLinkOutF('      .%C3A');
SetLinkOut('      .%C4AF', (3.04*clrFe2O3));
clrCaO:= GetLinkOutF('      .%C4AF');

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[2, 3]

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3CaOSiO2 (C3S-      ) = 40^65%.
2CaOSiO2 (c2S-      ) = 10^35%.
3CaOAl2O3 (C3A) = 3_12%.
4CaOAl2O3F2O3 (C4AF) = 10^17%.

```

3-6

C3S, C2S, C3A C4AF

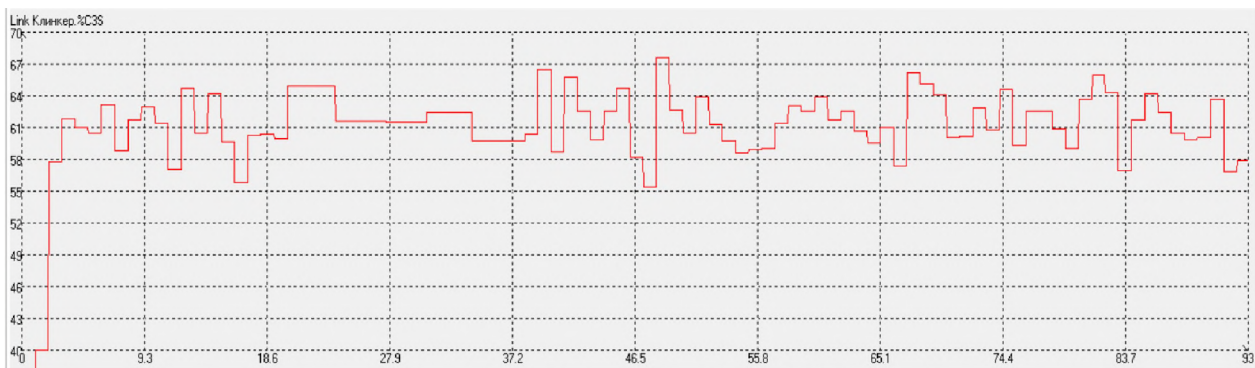
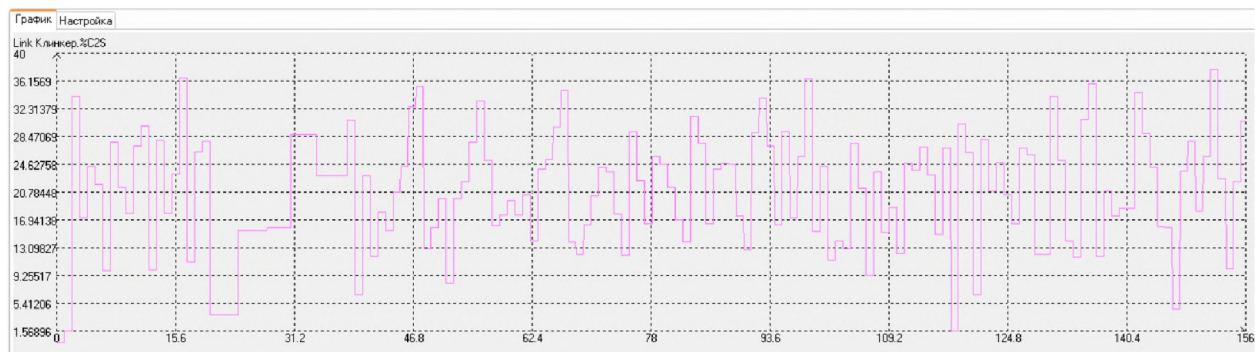


Рис.3. Изменение содержания C3S, %
Fig. 3. Change of component C3S, %



4. C2S, %
Fig.4. Change of component C2S, %

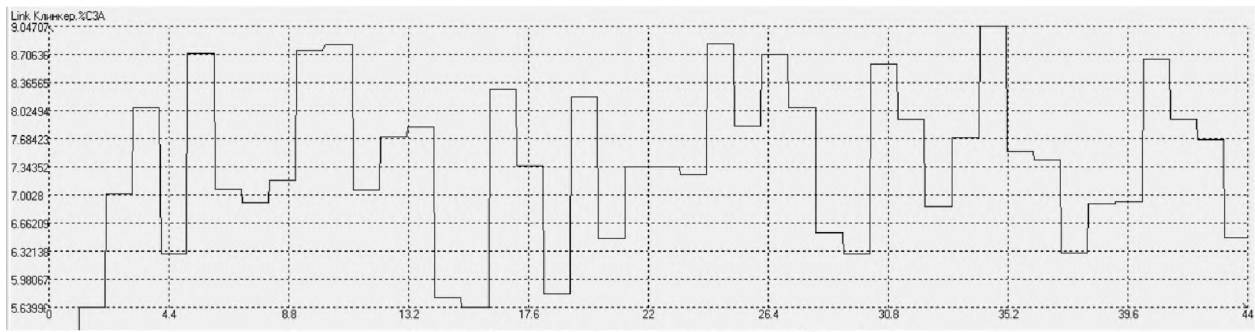


Рис. 5. Изменение содержания C3A, %
Fig. 5. Change of component C3A, %

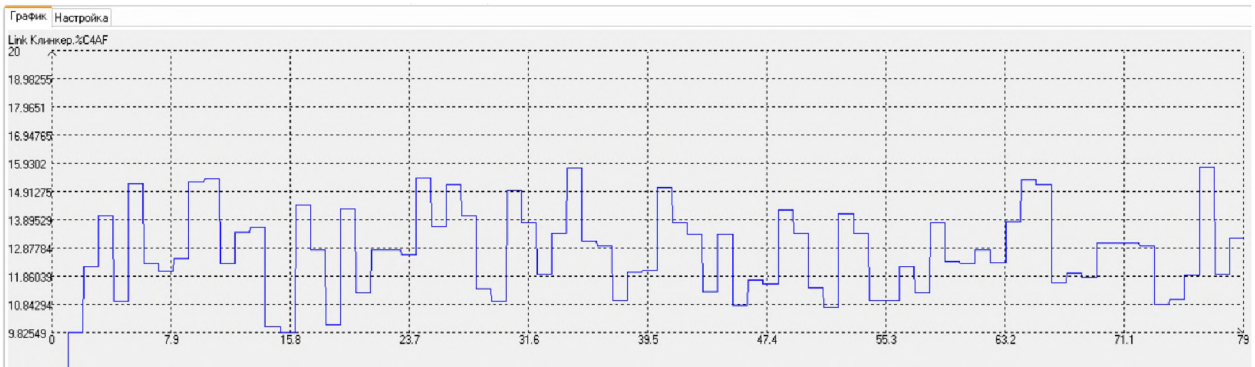


Рис. 6. Изменение содержания C4AF, %
Fig. 6. Change of component C4AF, %

19-07-00290, 19-07-00111.

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