ДОМАШНЕЕ ЗАДАНИЕ № 1 (второй семестр).

ОПЕРАТОРНЫЙ Метод РАСЧЕТА электрическОЙ цепИ.

Рассчитать операторным методом ток или напряжение, обозначенные на схеме.

Построить графики входного воздействия и реакции.

Определить постоянную времени цепи.

Единицы измерения: *e* [В], *i* [А], *R* [Ом], *L* [Гн], *C* [Ф].

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| 1 | $$e\_{1}(t)$$ | *L* | *R*1 | *R*2 | *R*3 | *R*4 | *R*5 | *S* |
| а | $$54-\left(54-54e^{-720t}\right)1(t)$$ | 0.0909 | 3 | 10 | 20 | 20 | 30 | размык |
| б | $$120+\left(120-120e^{-640t}\right)1(t)$$ | 0.2 | 40 | 20 | 40 | 40 | 40 | размык |
| в | $$160-\left(160-160e^{-500t}\right)1(t)$$ | 0.052632 | 16 | 10 | 50 | 25 | 40 | размык |
| г | $$100-\left(200-200e^{-400t}\right)1(t)$$ | 0.1 | 20 | 10 | 10 | 10 | 10 | размык |



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| 2 | $$e\_{1}(t)$$ | *E*2 | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$100-\left(100-100e^{-15t}\right)1(t)$$ | 40 | 0.01 | 10 | 30 | 20 | 20 | размык |
| б | $$120+\left(240-240e^{-2.5t}\right)1(t)$$ | 90 | 0.04 | 60 | 20 | 10 | 30 | размык |
| в | $$220-\left(220-220e^{-1.667t}\right)1(t)$$ | 50 | 0.05 | 20 | 30 | 14 | 5 | размык |
| г | $$200+\left(200-200e^{-50t}\right)1(t)$$ | 100 | 0.002 | 20 | 30 | 10 | 20 | размык |



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| 3 | $$e\_{1}(t)$$ | *E*2 | *L* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$30+\left(60-60e^{-25t}\right)1(t)$$ | 45 | 0.1 | 2.5 | 2.5 | 10 | 10 | размык |
| б | $$100-\left(200-200e^{-10t}\right)1(t)$$ | 150 | 0.5 | 5 | 1.67 | 10 | 10 | размык |
| в | $$120-\left(120-120e^{-30t}\right)1(t)$$ | 60 | 0.5 | 3 | 1.2 | 3 | 1 | размык |
| г | $$100-\left(200-200e^{-200t}\right)1(t)$$ | 50 | 0.2 | 10 | 20 | 20 | 20 | размык |



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| 4 | $$e\_{1}(t)$$ | *E*2 | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$120+\left(240-240e^{-1000t}\right)1(t)$$ | 40 | 9.524·10-5 | 3 | 10 | 5 | 2 | размык |
| б | $$200+\left(400-400e^{-4000t}\right)1(t)$$ | 140 | 1.143·10-4 | 10 | 30 | 60 | 10 | размык |
| в | $$180-\left(360-360e^{-200t}\right)1(t)$$ | 60 | 9.524·10-4 | 15 | 60 | 20 | 15 | размык |
| г | $$200-\left(200-200e^{-150t}\right)1(t)$$ | 100 | 0.001 | 20 | 20 | 20 | 20 | размык |



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| 5 | $$i\_{J}(t)$$ | *L* | *R*1 | *R*2 | *R*3 | *R*4 | *R*5 | *S* |
| а | $$3+\left(6-6e^{-640t}\right)1(t)$$ | 0.2 | 40 | 20 | 40 | 40 | 40 | размык |
| б | $$10-\left(10-10e^{-500t}\right)1(t)$$ | 0.052632 | 16 | 10 | 50 | 25 | 40 | размык |
| в | $$18+\left(36-36e^{-360t}\right)1(t)$$ | 0.04545 | 3 | 10 | 20 | 20 | 30 | размык |
| г | $$5+\left(5-5e^{-50t}\right)1(t)$$ | 0.2 | 20 | 10 | 10 | 10 | 10 | размык |



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| 6 | $$e(t)$$ | *J* | *L* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$100-\left(200-200e^{-10t}\right)1(t)$$ | 90 | 0.5 | 10 | 10 | 5 | 1.667 | размык |
| б | $$120-\left(120-120e^{-15t}\right)1(t)$$ | 50 | 0.5 | 1 | 3 | 3 | 1.2 | размык |
| в | $$30-\left(60-60e^{-50t}\right)1(t)$$ | 18 | 0.1 | 10 | 10 | 2.5 | 25 | размык |
| г | $$100-\left(200-200e^{-150t}\right)1(t)$$ | 2.5 | 0.1 | 20 | 20 | 20 | 10 | размык |



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| 7 | $$e(t)$$ | *J* | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$180+\left(360-360e^{-100t}\right)1(t)$$ | 1 | 4.762·10-4 | 60 | 15 | 20 | 15 | размык |
| б | $$120+\left(120-120e^{-2500t}\right)1(t)$$ | 4 | 9.524·10-5 | 10 | 2 | 5 | 3 | размык |
| в | $$200-\left(200-200e^{-4000t}\right)1(t)$$ | 4.667 | 1.429·10-5 | 30 | 10 | 60 | 10 | размык |
| г | $$100-\left(100-100e^{-150t}\right)1(t)$$ | 10 | 5·10-4 | 20 | 20 | 20 | 20 | размык |



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| 8 | $$e\_{1}(t)$$ | *U*1 | *L* | *R*1 | *R*2 | *R*3 | *S* |
| а | $$80-\left(80-80e^{-200t}\right)1(t)$$ | 40 | 0.1 | 40 | 20 | 40 | замык |
| б | $$60+\left(120-120e^{-200t}\right)1(t)$$ | 120 | 0.2 | 60 | 30 | 60 | замык |
| в | $$80+\left(160-160e^{-20t}\right)1(t)$$ | 20 | 0.5 | 5 | 5 | 10 | замык |
| г | $$50-\left(100-100e^{-200t}\right)1(t)$$ | 100 | 0.1 | 20 | 20 | 20 | замык |



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| 9 | $$e\_{1}(t)$$ | *E*2 | *L* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$40+\left(80-80e^{-200t}\right)1(t)$$ | 80 | 0.2 | 40 | 20 | 20 | 20 | размык |
| б | $$150-\left(300-300e^{-200t}\right)1(t)$$ | 300 | 0.5 | 60 | 30 | 12 | 8 | размык |
| в | $$30+\left(90-90e^{-200t}\right)1(t)$$ | 90 | 0.25 | 30 | 15 | 3 | 7 | размык |
| г | $$100-\left(200-200e^{-1000t}\right)1(t)$$ | 50 | 0.1 | 10 | 10 | 15 | 15 | размык |



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| 10 | $$e\_{1}(t)$$ | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$200-\left(200-200e^{-20t}\right)1(t)$$ | 4·10-3 | 5 | 20 | 10 | 5 | размык |
| б | $$180+\left(180-180e^{-20t}\right)1(t)$$ | 2.5·10-3 | 10 | 30 | 40 | 40 | размык |
| в | $$120-\left(120-120e^{-5t}\right)1(t)$$ | 4·10-3 | 20 | 5 | 30 | 10 | размык |
| г | $$100-\left(200-200e^{-100t}\right)1(t)$$ | 0.0005 | 20 | 20 | 20 | 20 | размык |



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| 11 | $$e\_{1}(t)$$ | *J* | *L* | *R*1 | *R*2 | *R*3 | *S* |
| а | $$30+\left(60-60e^{-200t}\right)1(t)$$ | 3 | 0.25 | 15 | 10 | 30 | размык |
| б | $$40+\left(120-120e^{-100t}\right)1(t)$$ | 2 | 0.2 | 20 | 40 | 40 | размык |
| в | $$150-\left(300-300e^{-50t}\right)1(t)$$ | 5 | 0.5 | 30 | 20 | 60 | размык |
| г | $$100-\left(200-200e^{-150t}\right)1(t)$$ | 2 | 0.2 | 20 | 40 | 10 | размык |



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| 12 | $$e\_{1}(t)$$ | *J* | *L* | *R*1 | *R*2 | *S* |
| а | $$12-\left(12-12e^{-300t}\right)1(t)$$ | 1 | 0.01 | 6 | 3 | размык |
| б | $$80+\left(80-80e^{-500t}\right)1(t)$$ | 8 | 0.02 | 20 | 40 | размык |
| в | $$150+\left(300-300e^{-1000t}\right)1(t)$$ | 5 | 0.01 | 30 | 15 | размык |
| г | $$200-\left(200-200e^{-100t}\right)1(t)$$ | 10 | 0.1 | 20 | 20 | размык |



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| 13 | $$e(t)$$ | *U*1 | *C* | *R*1 | *R*2 | *R*3 | *S* |
| а | $$40+\left(40-40e^{-250t}\right)1(t)$$ | 80 | 10-3 | 30 | 20 | 24 | размык |
| б | $$90-\left(90-90e^{-150t}\right)1(t)$$ | 30 | 4·10-3 | 30 | 15 | 5 | размык |
| в | $$300+\left(600-600e^{-300t}\right)1(t)$$ | 150 | 10-3 | 60 | 10 | 30 | размык |
| г | $$300-\left(300-300e^{-1000t}\right)1(t)$$ | 300 | 0.0005 | 40 | 40 | 20 | размык |



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| 14 | $$i\_{J}(t)$$ | *E*1 | *L* | *R*1 | *R*2 | *R*3 | *S* |
| а | $$16+\left(16-16e^{-10t}\right)1(t)$$ | 20 | 0.5 | 5 | 5 | 10 | замык |
| б | $$2-\left(4-4e^{-400t}\right)1(t)$$ | 40 | 0.1 | 40 | 20 | 40 | замык |
| в | $$1+\left(2-2e^{-200t}\right)1(t)$$ | 120 | 0.2 | 60 | 30 | 60 | замык |
| г | $$5-\left(10-10e^{-1000t}\right)1(t)$$ | 100 | 0.02 | 20 | 20 | 10 | замык |



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| 15 | $$i\_{J}(t)$$ | *E*1 | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$5-\left(5-5e^{-300t}\right)1(t)$$ | 150 | 10-3 | 30 | 60 | 10 | 10 | замык |
| б | $$2+\left(4-4e^{-250t}\right)1(t)$$ | 40 | 10-3 | 20 | 40 | 20 | 20 | замык |
| в | $$3-\left(6-6e^{-150t}\right)1(t)$$ | 30 | 4·10-3 | 15 | 30 | 5 | 5 | замык |
| г | $$5+\left(5-5e^{-300t}\right)1(t)$$ | 100 | 0.0005 | 20 | 20 | 5 | 5 | замык |



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| 16 | $$e\_{1}(t)$$ | *E*2 | *L* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$12-\left(12-12e^{-50t}\right)1(t)$$ | 15 | 0.1 | 1 | 2 | 3 | 4 | размык |
| б | $$20+\left(40-40e^{-30t}\right)1(t)$$ | 24 | 0.25 | 5 | 2 | 4 | 5 | размык |
| в | $$12-\left(24-24e^{-5t}\right)1(t)$$ | 8 | 0.3 | 6 | 1 | 3 | 6 | размык |
| г | $$50-\left(100-100e^{-100t}\right)1(t)$$ | 50 | 0.5 | 10 | 10 | 10 | 10 | размык |



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| 17 | $$i\_{J}(t)$$ | *E* | *L* | *R*1 | *R*2 | *R*3 | *S* |
| а | $$5-\left(5-5e^{-200t}\right)1(t)$$ | 20 | 0.3 | 10 | 18 | 12 | размык |
| б | $$9-\left(18-18e^{-100t}\right)1(t)$$ | 75 | 0.6 | 25 | 20 | 10 | размык |
| в | $$7+\left(14-14e^{-140t}\right)1(t)$$ | 72 | 0.5 | 12 | 15 | 20 | размык |
| г | $$10+\left(10-10e^{-200t}\right)1(t)$$ | 100 | 0.1 | 20 | 10 | 10 | размык |



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| 18 | $$e(t)$$ | *L* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$36-\left(36-36e^{-200t}\right)1(t)$$ | 0.01 | 6 | 4 | 2 | 8 | размык |
| б | $$20-\left(20-20e^{-140t}\right)1(t)$$ | 9.09·10-3 | 4 | 1 | 2 | 6 | размык |
| в | $$24+\left(24-24e^{-360t}\right)1(t)$$ | 0.02 | 6 | 3 | 2 | 6 | размык |
| г | $$100+\left(100-100e^{-120t}\right)1(t)$$ | 0.2 | 20 | 20 | 10 | 10 | размык |



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| 19 | $$e\_{2}(t)$$ | *E*1 | *C* | *R*1 | *R*2 | *R*3 | *S* |
| а | $$5-\left(5-5e^{-500t}\right)1(t)$$ | 12 | 0.5·10-3 | 2 | 3 | 4 | размык |
| б | $$7-\left(7-7e^{-500t}\right)1(t)$$ | 14 | 0.4·10-3 | 3 | 5 | 2 | размык |
| в | $$9-\left(18-18e^{-2000t}\right)1(t)$$ | 6 | 0.25·10-3 | 9 | 6 | 3 | размык |
| г | $$20+\left(20-20e^{-70t}\right)1(t)$$ | 40 | 0.002 | 30 | 20 | 20 | размык |



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| 20 | $$i\_{J1}(t)$$ | *J*2 | *L* | *R*1 | *R*2 | *R*3 | *S* |
| а | $$8-\left(8-8e^{-180t}\right)1(t)$$ | 3 | 0.4 | 27 | 9 | 4 | размык |
| б | $$11-\left(22-22e^{-55t}\right)1(t)$$ | 5 | 0.2 | 12 | 10 | 7 | размык |
| в | $$9+\left(18-18e^{-120t}\right)1(t)$$ | 12 | 0.1 | 8 | 16 | 24 | размык |
| г | $$10+\left(10-10e^{-200t}\right)1(t)$$ | 10 | 0.05 | 10 | 10 | 20 | размык |



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| 21 | $$e(t)$$ | *J* | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$24-\left(48-48e^{-5t}\right)1(t)$$ | 4 | 4·10-3 | 8 | 4 | 5 | 1 | размык |
| б | $$15-\left(15-15e^{-1000t}\right)1(t)$$ | 3 | 6.818·10-5 | 3 | 10 | 4 | 1 | размык |
| в | $$18+\left(36-36e^{-4500t}\right)1(t)$$ | 3 | 7.143·10-5 | 6 | 3 | 2 | 4 | размык |
| г | $$50-\left(100-100e^{-300t}\right)1(t)$$ | 5 | 0.0005 | 20 | 20 | 20 | 20 | размык |



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| 22 | $$e(t)$$ | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *R*5 | *S* |
| а | $$24-\left(24-24e^{-3000t}\right)1(t)$$ | 1.25·10-4 | 2 | 4 | 1 | 5 | 3 | размык |
| б | $$12-\left(24-24e^{-100t}\right)1(t)$$ | 0.5·10-3 | 6 | 3 | 4 | 2 | 4 | размык |
| в | $$15+\left(15-15e^{-200t}\right)1(t)$$ | 2.5·10-4 | 3 | 2 | 5.8 | 6 | 3 | размык |
| г | $$100+\left(100-100e^{-300t}\right)1(t)$$ | 1·10-4 | 20 | 20 | 20 | 20 | 20 | размык |



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| 23 | $$e\_{1}(t)$$ | *E*2 | *L* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$12-\left(12-12e^{-150t}\right)1(t)$$ | 9 | 0.01 | 4 | 1 | 3 | 5 | замык |
| б | $$20-\left(20-20e^{-1000t}\right)1(t)$$ | 8 | 0.002 | 6 | 3 | 4 | 5 | замык |
| в | $$15-\left(15-15e^{-40t}\right)1(t)$$ | 64 | 0.25 | 3 | 8 | 3 | 2 | замык |
| г | $$50+\left(100-100e^{-200t}\right)1(t)$$ | 50 | 0.1 | 20 | 10 | 10 | 10 | замык |



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| 24 | $$i\_{J}(t)$$ | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$8-\left(8-8e^{-3000t}\right)1(t)$$ | 10-4 | 3 | 4 | 2 | 3 | замык |
| б | $$7.5-\left(15-15e^{-100t}\right)1(t)$$ | 1.667·10-4 | 4 | 5 | 1 | 5 | замык |
| в | $$12+\left(24-24e^{-200t}\right)1(t)$$ | 2.5·10-4 | 2 | 7 | 9 | 6 | замык |
| г | $$5+\left(10-10e^{-450t}\right)1(t)$$ | 2.5·10-4 | 5 | 20 | 20 | 5 | замык |



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| 25 | $$i\_{J}(t)$$ | *E* | *C* | *R*1 | *R*2 | *R*3 | *S* |
| а | $$1-\left(2-2e^{-200t}\right)1(t)$$ | 120 | 4·10-4 | 250 | 15 | 10 | размык |
| б | $$0.25-\left(0.25-0.25e^{-100t}\right)1(t)$$ | 110 | 10-4 | 50 | 10 | 40 | размык |
| в | $$0.5+\left(1-1e^{-200t}\right)1(t)$$ | 100 | 2.5·10-5 | 20 | 20 | 80 | размык |
| г | $$5-\left(10-10e^{-400t}\right)1(t)$$ | 50 | 5·10-4 | 20 | 10 | 10 | размык |



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| 26 | $$e\_{2}(t)$$ | *E*1 | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$24-\left(24-24e^{-10^{5}t}\right)1(t)$$ | 32 | 3.704·10-6 | 8 | 1 | 3 | 6 | размык |
| б | $$25-\left(50-50e^{-2000t}\right)1(t)$$ | 15 | 6.667·10-5 | 3 | 5 | 10 | 5 | размык |
| в | $$12+\left(12-12e^{-1000t}\right)1(t)$$ | 16 | 1.25·10-4 | 4 | 4 | 5 | 3 | размык |
| г | $$100+\left(100-100e^{-200t}\right)1(t)$$ | 200 | 5·10-4 | 10 | 40 | 20 | 20 | размык |



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| 27 | $$e(t)$$ | *J* | *L* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$12+\left(12-12e^{-8t}\right)1(t)$$ | 10 | 1.857 | 3 | 3 | 8 | 4 | замык |
| б | $$15+\left(30-30e^{-20t}\right)1(t)$$ | 5 | 0.3 | 3 | 1 | 4 | 1 | замык |
| в | $$18-\left(36-36e^{-20t}\right)1(t)$$ | 8 | 0.143 | 9 | 3 | 2 | 4 | замык |
| г | $$100+\left(200-200e^{-150t}\right)1(t)$$ | 5 | 0.1 | 10 | 10 | 20 | 20 | замык |



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| 28 | $$e(t)$$ | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$24-\left(48-48e^{-1.8t}\right)1(t)$$ | 0.25 | 2 | 4 | 6 | 5 | размык |
| б | $$120+\left(240-240e^{-0.5t}\right)1(t)$$ | 0.4 | 6 | 9 | 3 | 6 | размык |
| в | $$150+\left(450-450e^{-4t}\right)1(t)$$ | 0.01 | 30 | 20 | 25 | 32 | размык |
| г | $$100+\left(100-100e^{-200t}\right)1(t)$$ | 3·10-4 | 20 | 20 | 20 | 20 | размык |



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| 29 | $$i\_{J}(t)$$ | *U*1 | *C* | *R*1 | *R*2 | *R*3 | *R*4 | *S* |
| а | $$3-\left(3-3e^{-2t}\right)1(t)$$ | 48 | 0.25 | 6 | 6 | 8 | 4 | размык |
| б | $$12-\left(24-24e^{-0.2t}\right)1(t)$$ | 60 | 2.833 | 15 | 5 | 4 | 8 | размык |
| в | $$6+\left(12-12e^{-5t}\right)1(t)$$ | 20 | 0.01667 | 4 | 12 | 6 | 6 | размык |
| г | $$2.5-\left(5-5e^{-300t}\right)1(t)$$ | 50 | 5·10-4 | 20 | 20 | 20 | 20 | размык |



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| 30 | $$i\_{J}(t)$$ | *E*1 | *C* | *R*1 | *R*2 | *R*3 | *S* |
| а | $$12-\left(12-12e^{-0.2t}\right)1(t)$$ | 24 | 0.5 | 6 | 12 | 16 | замык |
| б | $$15+\left(30-30e^{-0.1t}\right)1(t)$$ | 10 | 3.571 | 8 | 2 | 4 | замык |
| в | $$10-\left(20-20e^{-0.2t}\right)1(t)$$ | 120 | 0.1 | 1 | 9 | 99 | замык |
| г | $$2-\left(2-2e^{-50t}\right)1(t)$$ | 50 | 0.002 | 20 | 20 | 10 | замык |

