Fbgbkl_jkl\h gZmdb b \ukr_]h h[jZah\Zgby Jhkkbckdh
N_^_jZevgh_]hkm^Zjkl_ggh_ [x^`_lgh_ h[jZah\Zl_evg
\ukr_]h h[jZah\Zgby
©Kfhe_gkdbc]hkm^Zjkl_gguc mgb_jkbl_lª

DZn_^jZ fZl_fZlbq_kdh]h ZgZebaZ

©Ml_j`^Zxª
ljhj_dlhj ih m-q_[gh
f_lh^bq_kdhc jZ[hl_
BBBBBBBBBBBB X : Mklb
©23ª bxgy 2022]

GZijZ\e_gb_ ih^]hlh\db

GZijZ\e_gghklv):ijhnbev
NhjfZ h[mq_gby hqgZy
Dmjk 4 ±
K_f_klj 7 ±
<k_]h aZq_lguo _^bgbp 2 ±
NhjfZ hlq_lghklb aZq_l ±

ljh]jZffm jZajZ[hlZe
^hdlhj nba.-fZl. gZmd ijhn_kkhj JZkmeh\ D F

H^h[j_gZ gZ aZk_^Zgbb dZn_^ju
©16ª bxgy] ijhlhdhe 10
AZ_^mxsbc dZn_^jhc BBBBBBBBBBBBB D F JZkmeh\

Kfhe_gkd
2022

GZklhysZy ^bkpbiebgZ ih \u[hjm lhhl_lkl\mxs_c ki_pbZevghklb ieZg
[ZdZeZ\jbZlZ gZijZ\e_gby 44.03.05 I_^Z]h]bq_kdh_ h[jZah\Zgb_
ijhnbeyfb ih^]hlh\db FZl_fZlbdZ BgnhjfZlbdZ dhlhjZy nh
h[jZah\Zl_evguo hlghr_gbc g\Z_b\Z_lky qlh bgl_]jZe lbiZ
hkgh\guf fZl_fZlbq_kdbf ih gylbc ijb hkh\gbb ebg_cguo djZ_\uo
kh\j_f_gghc bgl_]jZebq_kdhc ... dhfie_dkgh]h i_j_f_gghc ^ey
j_r_gby jZkkfZljb\Z_luo aZ^Zq bkihevamxlky l_hj_lbq_kd
ijZdlbq_kdb \k_o hkgh\guo fZl_fZlbq_kdbo ^bkpbiebg fZ
Ze]_[ju]_hf_ljbb l_hjbb nmgdpbc ^_ckl\bl_evgh]h i_j_f_
dhfie_dkgh]h i_j_f_ggh]h l_hjbb ^bnn_j_gpbZevguo m
fZl_fZlbq_kdhc nbabdb ij_^mkfhlj_gguo \ mq_[ghf ieZg
ih^]hlh\db =eZ\gh_ gZagZq_gb_ ... kl\ klm^_gl ... hkgh\ ckl\
bgl_]jZeZ lbiZ Dhrb ihkljhblv l_hjbx jZaj_rbfhklb ... \uq
aZ^Zq dhfie_dkgh]h ... fZgZ b aZ^Zqb =bev[_jlZ
lhkdhevdm djZ_\u_ aZ^Zqb JbfZgZ b =bev[_jlZ ... ^bnn_j_g
fgh]hqbke_ggu_ ijbf_g_gby \ jZaebqguo ijbdeZ^guo gZmdZo
nbevljZpbb f_oZgbdZ kiehrghc kj_^u b ^j lh gZklhysZy
ij_ke_^m_l ^_ hkgh\gu_ p_eb
dhfie_dkgh_ ih\lhj_gb_ \ ... b ... fZl_fZlbq_kdbo
^bkpbiebg fZl_fZlbq_kdh]h ZgZebaZ Ze]_[ju]_hf_ljb
^_ckl\bl_evgh]h i_j_f_ggh]h l_hjbb nmgdpbc dhfie_dkgh]
^bnn_j_gpbZevguo mjZ\g_gbc fZl_fZlbq_kdhc nbabdb
ijZdlbq_kdh_ ijbf_g_gb_ ihemq_gguo fZl_fZlbq_kdbo agZ
fZl_fZlbq_kdbo fh^_e_c keh`guo y\e_gbc ijhbkoh^ysbo \ hdj

Dhfi_l_gpby	Bg^bdZlhju ^hklb`_gby
-5. Kihkh[_g hkihevah\Zlv ... agZgby \ ij_^f_lghc h[eZklb ijhp_kk_ nhjfbjh\Zgby dhfi_l_gpbb h[mqZxsboky j_ZebaZpbb hkgh\ghc h[s_ ijh]jZffu	hkgh\gu_ _kl_kl_gghgZmqguo ^bkpb ZiiZjZl fZl_fZlbdb gu_h[o^ hkms_kl\e_gby ijhn_k ^_yl_evghklb ijbf_gylv agZgby \ _kl_kl_gghgZmqguo b fZ ^bkpbiebg ^ey ijh_^_gby l_ wdki_jbf_glZevguo bkke_ ijhn_kkbhgZevghc ^_yl_evg f_lh^Zfb dhfie_dkgh]h ... fh^_ebjh\Zgby gZ\udZfb _kl_kl_gghgZmqgh]h agZgb hkms_kl\eylv bkke_^h\ ijhn_kkbhgZevghc ^_yl_evg
-7. Kihkh[_g fZl_fZlbq_kdb d kl\blv _kl_kl_gghgZmqgu deZkkbq_kdb_ aZ^Zqb ... ^hdZaZlv ml_j`^_gb_ k j_amevlZl m\b^_lv ke_^kl\ j_amevlZlZ	: hkgh\gu_ k\hckl\Z bgl Dhrb Z lZd`_ ihklZgh\db j_r_gby djZ_\uo aZ^Zq JbfZ ^ey ZgZebq_kdbo nmgdpb i_j_f_gghh \ h^ghk\yaguo h[e : bkihevah\Zlv k\hckl\Z lbiZ Dhrb ^ey j_r_gby djZ_\uo aZ^Zq lbiZ JbfZ

	=bev[_jlZ ^ey ZgZeblbq_kd djm]h\uo h[eZklyo; l_ogbdhc \uqbke_gby lbiZ Dhrb b f_lh^Zfby j_d aZ^Zq JbfZgZ b =bev[_jlZ djm]h\uo h[eZklyo.

=eZ^db_ djbые b ZgZeblbq_k djb\u_ gZ eh_dfk iehkdhklb b bo k\hckl\Z $C(L)$, $C^1(L)$ nmgdp $H_\mu(L)$ lhgylb_ bgl_]jZeZ lbiZ Dhrb b _]h hkgh\gu_ k\hckl\Z

Hkh[uc kbg]meyjguc bgl_]jZe k y^jhf Dhrbb _]h \uqbke_gb_ =jZgb bgl_]jZeZ lbiZ Dhrb b nhjfmeu KhohpdhcIexf_eu h[jZs_gby hk bgl_]jZeZ k y^jhf Dhrb

L_hj_fZ[ZgZeblbq_kdhf ij_^hlg_`_gbb nm\beey ijbgpbi kbff_ljbb ijbgpbi Zj]mf_glZ bg^_dkZ g_ij_ju\ghc nmg _]h]_hf_ljbq_kdbc kfuke F_lh^u \uqbke_gby bg^_dkZ

AZ^Zq JbfZgZ H^ghjh^gZy aZ JbfZgZ b f_lh^ __ j_r_gby \ deZkkZo h]jZgbq_gguo bkq_aZ nmgdpbc

lhklZgh\dZ h^ghjh^ghc aZ^Zqb JbfZgZ F_lh^ j_r_gby g_h^ghjh^ghc aZ^Zqb JbfZgZ \ deZk bkq_aZxsbo gZ [_kdhg_qghklb nmgdpbc

OZjZdl_jbklbq_kdh_ bgl_]jZevgh_ mjZ\g_g b f_lh^ _]h j_r_gby fu G_l_jZ

lhklZgh\dZ djZ_\hc aZ^Zqb =bev[_jlZ ^ey ZgZeblb h^ghk\yaguo h[eZklyo F_lh^ dhgnhjfgh]h hlh[jZ`_gby ijb j_ =bev[_jlZ H j_r_gbb aZ^Zqb =bev[_jlZ \ djm]h\uo h[eZklyo aZ^Zq >bjboe_ b G_cfZgZ ^ey]Zjfhgbq_kdbo nmgdpbc

.lhklZgh\db djZ_\uo aZ^Zq >bjboe_ b G_cfZgZ ^ey nmgdpbc h^ghk\yaguo h[eZklyo. K\yav ^Zggh]h deZkkZ g_ i_j_f_gguo ZgZeblbq_kdbo nmgdpbc dkgh]h i_j_f_ggh]h J_ djZ_\uo aZ^Zq >bjboe_ b G_cfZgZ ^ey]Zjfhgbq_kdbo nmgd aZ^Zqb =bev[_jlZ ^ey ZgZeblbq_kdbo nmgdpbc

‹ i i	L_fu	<k_]h qZkh\	Nhjfu aZgylbc		
			E_dpb	ljZdl-b q_kdb_ aZgylb	KZfhklhy-l_evgZ jZ[hlZ
1.	DeZkk nmgdpbc m^h\e_l\hjyxsbo mkeh\ =_ev^_jZ . Bgl_]jZe lbiZ D _]h hkgh\gu_ k\hckl\Z	8	2	2	4
2.	Hkh[uc kbg]meyjguc _]h \uqbke_gb_. =jZgbqgu_ k\hckl\Z bgl_]jZeZ lbi nhjfmeu Kho-Ieh_fi_eb	8	2	2	4
3.	Hkgh\gu_ l_hj_fu dhfie_ ZgZebaZ bkihevam_fu djZ_\uo aZ^Zq db_ bg^_ g_ij_ju\ghc nmgdpbb	8	2	2	4
4.	H^ghjh^gZy djZ_\Zy aZ^Zq JbfZgZ ^ey ZgZeblbq_ nmgdpbc \ h^ghk\yagu b f_lh^ __ j_r_gby	10	2	2	6
5.	G_h^ghjh^gZy djZ_\Zy aZ^Z JbfZgZ ^ey ZgZeblbq_ nmgdpbc \ h^ghk\yagu b f_lh^ __ j_r_gby	10	2	2	6
6.	Kbg]meyjgu_ bgl_]jZe mjZ\g_gby b bo k\yav aZ^Zq_c JbfZgZ	10	2	2	6
7.	DjZ_\Zy aZ^ZqZ =bev ZgZeblbq_kdbo nmgdp __ j_r_gby \ djm]Zk\uo	10	2	2	6
8.	Dhfie_dkgu_ f_lh^u j_ djZ_\uo aZ^Zq >bjbo ^ey]Zjfhgbq_kdbo nm ^_ckl\bl_evguo i_j_f_ _^bgbqghf djm]_	8	2	2	4
	Blh]h	72	16	16	40

Лекции

DeZkku nmgdpbc $C(L)$, $C^1(L)$ b $H_\mu(L)$. Ihgylb_ bgl_]jZeZ lbiZ Dhrb b _]h hkgh\gu_ k\hckl\Z

Hkh[uc kbg]meyjguc bgl_]jZe k y^jhf Dhrbb _]h \uqbke_gb_ =jZgb bgl_]jZeZ lbiZ Dhrb b nhjfmeu Kho-Ieh_fi_eb. Nhjfmeu h[jZs_gby hk bgl_]jZeZ k y^jhf Dhrb

L_hj_fZ 2[ZgZeblbq_kdhf

ijh^he`_gb_, glbh j_fZ Ebmlbeey i kbff_ljbb ijbgpbim аргумента.

F_lh^u \uqbke_gby g_bg^_dk \gZ nmgdpbb.

A Z^Zqb ^ey kZdZqd_ H^ghjh^gZy aZ

JbfZgZ \ deZkkZo h]jZgbq_gguo bkq_aZxsbo gZ [_kdhg_qg

IhklZgh\dZ h^ghjh^ghc

aZ^ZqbJbfZgZ E_lh^ j_r_gby g_h^ghjh^ghc aZ^Zqb JbfZgZ \ deZk

bkq_aZxsbo gZ [_kdhg_qghklb nmgdpbc

Bgl_]jZevgu_ mjZ\g_gby Nj_^]hevfZ. Nj_^]

OZjZdl_jbklbq_kdh_ bgl_]jZevgh_ mjZ\g_gb_ b f_lh^ j_

h ihegho] mjZ\g_gbb bgl_]jZevguo mjZ\g_gbyo b l_hj_fu G_l_jZ

IhklZgh\dZ djZ_\hc aZ^Zqb =bev[_jlZ ^ey ZgZeblb

h^ghk\yaguo h[eZklyo F_lh^ dhgnhjfgh]h hlh[jZ`_gby ijb

=bev[_jlZ H j_r_gbb aZ^Zqb =bev[_jlZ \ djm]h\uo h[eZklyo

IhklZgh\db djZ_\uo aZ^Zq >bjboe_ b G_cfZgZ ^ey]Zjfh

h^ghk\yaguo h[eZklyo. >bjboe_ G_cfZgZ ^ey]Zjfhgbq_kdbo nm

qZklgu_ kemqZb djZ_\hc aZ^Zqb =bev[_jlZ ^ey ZgZeblbq_kdbo nmg

Практические занятия

Класс функций, удовлетворяющих условию Гельдера.
Интеграл типа Коши и его основные свойства

>Zcl_ hij_^_e_gb_ deZkkZ nmgdpbc m^h\e_l\hjyxsbo m

fgh`_kl_ L.

ImklvC $C(L)$ – deZkk *непрерывных* gZ fgh`_kl_ L nmgdpbc, $H_\mu(L)$ – deZkk

nmgdpbc m^h\e_l\hjyxsbo gZ fgh`_kl_ L *условию Гельдера* Z $C^1(L)$ – deZkk

непрерывно дифференцируемых gZ fgh`_kl\_ $L$ nmgdpbc. >hdZ`bl_ kkhlgh

$C^1(L) \subset H_\mu(L) \subset C(L)$.

>Zcl_ hij_^_e_gb_ bgl_]jZeZ lbiZ Dhrb. Ihklhjhcl_ ijbf_j

ijhklhc dmkhqgh-]eZ^dhc djb\hc

< dZdbo lhqdZo dhfie_dkghc iehkdhklb y\ey_lky Z

hij_^_ey_fZy bgl_]jZehf lbiZ Dhrb"

Knhjfmebjmcl_ l_hj_fm h ^bnn_j_gpbjm_fhklb bgl_]jZe

<_jgh eb ml_j`^_gb_: *если $f(z)$ – аналитическая функция в некоторой области D, то $f'(z)$ также является аналитической в этой области*" Hl_l h[hkgmcl_

>hdZ`bl_ qlh bgl_]jZe lbiZ Dhrb h[jZsZ_lky \ gmev \ l $z=\infty$

>hdZ`bl_ kijZ\_^eb\hklv ke_^mxs_]h ml\_j`^_gby: *если функция $f(z)$ является аналитической в односвязной области D, то для любой замкнутой простой гладкой кривой $\gamma \subset D$ имеет место формула*

$$\frac{1}{2\pi i}\int_{\gamma}\frac{f(t)dt}{t-z}=\begin{cases} f(z), & \textit{если } z\in G^{+},\\ \frac{1}{2}f(z), & \textit{если } z\in\gamma,\\ 0, & \textit{если } z\in D\setminus(G^{+}\cup\gamma),\end{cases}$$

где G^{+} *– конечная область, ограниченная кривой* γ.

>hdZ`bl_ qlh g_ij_ju\gZy gZ hlj_ad_ $\left[0;\frac{1}{2}\right]$ nmgdpby

$$g(x)=\begin{cases}\frac{1}{\ln x}, & \textit{если } x\neq 0,\\ 0, & \textit{если } x=0,\end{cases}$$

g_ m^h\e_l\hjy_l gZ wlhf hlj_ad_ mkeh\bx =_ev^_jZ

lhevamykv nhjfmehc ^ey ijhba\h^guo \ukrbo ihjy nmgdpbc \uqbkebl_ ke_^mxsb_ bgl_]jZeu

Z $\oint_L \frac{\cos z}{z^2}dz$]^_ $L=\{z:\ |z|=1\}$;

[$\oint_L \frac{\sin z}{\left(z-\frac{\pi}{3}\right)^3}dz$]^_ $L=\{z:\ |z-i|=4\}$.

GZc^bl_ i_j\hh[jZagu_ nmgdpbc

Z e^{az};

[$\sin az$;

\ $e^{az}\cos bz$,]^_ a b b – hlebqgu_ hl gmey dhgklZglu

<uqbkebl_ ke_^mxsb_ bgl_]jZeu lbiZ Dhrb

Z $\frac{1}{2\pi i}\int_L \frac{(\cos\tau-3\tau^5-\tau^{-6})d\tau}{\tau-z}$]^_ $L=\{\tau:\ |\tau|=1\}$;

[$\frac{1}{2\pi i}\int_L \frac{(\tau e^{\tau}+5\tau^{-2})d\tau}{\tau-z}$]^_ $L=\{\tau:\ |\tau+i|=5\}$.

ljb_^bl_ ijbf_j nmgdpbb m^h\e_l\hjyxs_c gZ gL_dhlhj mkeh\bx =_ev^_jZ gh g_ ^bnn_j_gpbjm_fhc gZ wlhf fgh`_kl\

lhevamykv nhjfmehc ^ey ijhba\h^guo \ukrbo ihjy nmgdpbc \uqbkebl_ ke_^mxsb_ bgl_]jZeu

Z $\oint_L \frac{\cos z}{(z-i)^3}dz$]^_ $L=\{z:\ |z-i|=1\}$;

[$\oint_L \frac{e^z}{(z-1)^3}dz$]^_ .

GZc^bl_ i_j\hh[jZagu_ ke_^mxsbo – nmgdpbc h]^_gm dhgklZglZ

Z $\cos az$;

[ze^{az};

\ $z\cos az$.

<uqbkebl_ ke_^mxsb_ bgl_]jZeu lbiZ Dhrb

Z $\dfrac{1}{2\pi i}\displaystyle\int_L \dfrac{(16\tau - 2\tau^{-5})d\tau}{\tau - z}$]^_ $L = \{\tau : |\tau| = 8\}$;

[$\dfrac{1}{2\pi i}\displaystyle\int_L \dfrac{(4e^{\tau} - 5\cos\tau + \tau^{-4})d\tau}{\tau - z}$]^_ $L = \{\tau : |\tau - 2i| = 3\}$.

Особый (сингулярный) интеграл и его вычисление. Граничные свойства интеграла типа Коши и формулы Сохоцкого–Племели

>Zcl_ hij_^_e_gb_]eZ\gh]h agZq_gby kbg]meyjgh]h b g_ij_ju\ghc \ kfuke_ =_ev^_jZ iehlghklvx

DZdh\Z Zkbfilhlbdz bgl_]jZeZ lbiZ Dhrb \[ebab dh bgl_]jbjh\Zgby"

Ih dZdbf nhjfmeZf hij_^_eyxlky]jZgbqgu_ agZq_gby iehlghklvx ba deZkkZ =_ev^_jZ"

>hdZ`bl_ kijZ_^eb\hklv ke_^mx *если Γ – замкнутый гладкий контур и* $\varphi(\tau) \in H^{(m)}(\Gamma)$, $m \in \mathbf{N}$, *то справедливы формулы*:

$$\Phi^{(m)}(z) = \frac{1}{2\pi i}\int_\Gamma \frac{\varphi^{(m)}(\tau)}{\tau - z}d\tau, \quad z \neq \Gamma, \qquad (2.1)$$

$$- \qquad \frac{}{} \quad \frac{(\;)}{} \qquad (2.2)$$

$$[\Phi^{(m)}(t)]^{-} = [\Phi^{-}(t)]^{(m)} = -\frac{1}{2}\varphi^{(m)}(t) + \frac{1}{2\pi i}\int_\Gamma \frac{\varphi^{(m)}(\tau)}{\tau - z}d\tau, \quad t \in \Gamma. \qquad (2.3)$$

GZibrbl_ nhjfmeu h[jZs_gby kbg]meyjgh]h bgl_]jZevg Dhrb ih aZfdgmlhc djb\hc

lmkv $0 < a < c < b < +\infty$, n – g_q_lgh_ gZlmjZevgh_ qbkeh. IhdZ`bl_ qlh hkh[uc bgl_]jZe $\displaystyle\int_a^b \frac{dx}{(x-c)^n}$, hij_^_e_gguc dZd]eZ\gh_ agZq_gb_ kms_

kem`bl *необходимым* b *достаточным* mkeh\b_f ^ey lh]h qlh[u $\rho(t)$ y\eyeZkv
]jZgbqgu f agZq_gb_f ZgZeblbq_kdhc nmgdpbb $T(z)$ ..._aZxs_c g
[_kdhg_qghklb

lmklv $\gamma = \{t: |t| = \rho\}, \quad \rho > 0$ <uqbkebl_ agZq_gb_ kbg]meyjgh]h

$$\frac{1}{2\pi i}\int_{\gamma}\frac{(\sin\tau - \tau^{-3})d\tau}{\tau - t}.$$

<uqbkebl_]jZgbqgu_ agZq_gby ke_^mxsbo bgl_]jZeh

Z $\frac{1}{2\pi i}\int_{L}\frac{(\tau^{2} - 7\tau^{-4})d\tau}{\tau - z}$]^_ $L = \{\tau: |\tau| = 2\}$;

[$\frac{1}{2\pi i}\int_{L}\frac{(3\tau - 5\sin^{2}\tau - \tau^{-7})d\tau}{\tau - z}$]^_ $L = \{\tau: |\tau - 5i| = 7\}$.

Основные теоремы комплексного анализа, используемые в теории краевых задач. Индекс непрерывной функции.

< dZdhf kemqZ_ $F(z)$ nmgdpby ZgZebl ... ^hd`_gb_f
nmgdpbb $f(z)$ ljb_^bl_ ijbf_ju

Kdhevdbfb kihkh[Zfb fh`gh ZgZeblbq_kdb ijh^he`blv
fgh`_kl\Z bf_xs_]h ij_^_evgmx lhqdm"

< q_f khklhbl kmlv l_hj_fu Ebm\beey ^ey ZgZeblbq_kd

Knhjfmebjmcl_ ijbgpbi kbff_ljbb ^ey ZgZeblbq_kdbo nmg

< q_f khklhbl ijbgpbi Zj]mf_glZ ^ey f_jhfhjnguo nmgdp

6. Knhjfmebjmcl_ l_hj_fm Jmr_ ljb_^bl_ ijbf_ju __ bkihevа

>Zcl_ hij_^_e_gb_ bg^_dkZ g_ij_ju\ghc nmgdpbb ih
]eZdhfm dhglmjm

Ih dZdhc nhjfme_ \uqbkey_lky bg^_dk nmgdpbb y
agZq_gb_f ZgZeblbq_kdhc nmgdpbb"

3.1. >hdZ`bl_ qlh nmgdpby y\ey_lky ZgZeblbq_

ijh^he`_gb_f nmgdpbb $f(z) = \sum_{n=0}^{\infty} z^{n}$.

Fh`_l eb nmgdpby [ulv h]jZgbq_gghc ih fh^m
dhfie_dkghc iehkdhklb" Hl_l h[hkgmcl_

GZc^bl_ j_r_gb_ ke_^mxs_c aZ^Zqb h kdZqd_ \ d
[_kdhg_qghklb nmgdpbc

$$\Phi^{+}(t)-\Phi^{-}(t)=2e^{t}+\frac{1}{t^{5}},\quad t\in L,$$

]^ $L=\{t:|t|=1\}.$

J_rbl_ ke_^mxsb_ h^ghjh^gu_ _deZkk aZ^Zqb Jbf ZgZ nhjfmdpbc h]jZg
gZ [_kdhg_qghklb

Z $\Phi^{+}(t)=\frac{5+t}{t}\Phi^{-}(t),\; t\in L;$ [$\Phi^{+}(t)=\frac{t(t-2i)}{t^{2}+3}\Phi^{-}(t),\quad t\in L,$

]^ $L=\{t:|t|=1\}.$

J_rbl_ ke_^mxsb_ h^ghjh^gu_ aZ^Zqb JbfZgZ \ deZk
gZ [_kdhg_qghklb

Z $\Phi^{+}(t)=\frac{t^{3}}{t^{3}+9}\Phi^{-}(t),\; t\in L;$ [$\Phi^{+}(t)=\frac{t^{2}(t-4i)}{2t-1}\Phi^{-}(t),\quad t\in L,$

]^ $L=\{t:|t|=1\}.$

lmklv . ljb dZdbo agZq_gbyo a ih^ghjh^gZy aZ^ZqZ
JbfZgZ

$$\Phi^{+}(t)=\frac{t}{t^{2}+a}\Phi^{-}(t),\; t\in L,$$

\ deZkk_ h]jZgbq_gguo gZ [_kdhg_qghklb nmgdpbc bf__l g
h[hkgmcl_

GZc^bl_ j_r_gb_ ke_^mxs_c aZ^Zqb h kdZqd_ \ deZkk_
[_kdhg_qghklb nmgdpbc

$$\Phi^{+}(t)-\Phi^{-}(t)=3i\sin t-\frac{\sqrt{2}}{t^{2}},\quad t\in L,$$

]^ $L=\{t:|t|=1\}.$

J_rbl_ ke_^mxsb_ h^ghjh^gu_ aZ^Zqb JbfZgZ \ deZk
gZ [_kdhg_qghklb

Z $\Phi^{+}(t)=\frac{t}{t-3}\Phi^{-}(t),\; t\in L;$ [$,\quad t\in L,$

]^ $L=\{t:|t|=1\}.$

J_rbl_ ke_^mxsb_ h^ghjh^gu_ aZ^Zqb JbfZgZ \ deZk
gZ [_kdhg_qghklb

Z $\Phi^{+}(t)=\frac{t+2}{t^{2}-9}\Phi^{-}(t),\; t\in L;$ [$\Phi^{+}(t)=\frac{t^{8}}{4t-1}\Phi^{-}(t),\quad t\in L,$

]^ $L=\{t:|t|=1\}.$

I m k l v . l j b d Z d b o a g Z q _ g b y o a i Z ^ Z h j h ^ g Z y a Z ^ Z J b f Z g Z

$$\Phi^+(t)=\frac{t^2-a}{t^2+a}\Phi^-(t),\ t\in L,$$

\ d e Z k k _ h] j Z g b q _ g g u o g Z [_ k d h g _ q g h k l b n m g d p b c b f _ _ l h [h k g m c l _

Метод решения неоднородной краевой задачи Римана для аналитических функций комплексного переменного

1. K n h j f m e b j m c l _ i h k l Z g h \ d m g _ h ^ g h j h ^ g h c a Z ^ Z q b J b f Z g Z Z g Z e b l b q _ k d b o n m g d p b c \ k e m q Z _] _ e v ^ _ j h \ u o d h w n n b p b _ g l
2. Q l h g Z a u \ Z _ l k y b g ^ _ d k h f g _ h ^ g h j h ^ g h c a Z ^ Z q b J b f Z g Z
3. D Z d h \ Z k l j m d l m j Z h [s _] h j _ r _ g b y g _ h ^ g h j h ^ g h c a Z ^ Z q b J b f Z
4. < q _ f k h k l h b l h k g h \ g Z y e h] b q _ k d Z y k o _ f Z f _ l h ^ Z j _ r _ g b y g ^ e y Z g Z e b l b q _ k d b o n m g d p b c "
5. K n h j f m e b j m c l _ l _ h j _ f m N > = Z o h \ Z h j Z a j _ r b f h k l b a Z ^ Z q b J b f Z g Z d e Z k k _ h] j Z g b q _ g g u o b k q _ a Z x s b o g Z [_ k d h g _ q g h k l b n m g d p
6. B a e h ` b l _ k m l v © m i j h s _ g g h] h ª f _ l h ^ Z j _ r _ g b y g _ h ^ g h j h ^ h ^ g h k \ y a g u o h [e Z k l y o \ k e m q Z _ d h] ^ Z d h w n n b p b _ g l d j Z _ \ h n m g d p b y g _ b f _ _ l g m e _ c b i h e x k h \ g Z d h g l m j _

I m k l v J _ r b l _ k e _ ^ m x s b _ d j Z _ \ u _ a Z ^ Z q b J b d m k h q g h Z g Z e b l b q _ k d b o n m g d p b c h] j Z g b q _ g g u o g Z [_ k d h g _

Z $\Phi^+(t)=\frac{5+t}{t}\Phi^-(t)+t^3-\frac{\sqrt{3}}{t},\ t\in L;$

[$\Phi^+(t)=\frac{t(t-2i)}{t^2+3}\Phi^-(t)-21t^5+\frac{7}{t^5},\ t\in L;$

\ $\Phi^+(t)=\frac{3}{t^3}\Phi^-(t)+t^6-\frac{11}{t^{10}},\ t\in L.$

J _ r b l _ k e _ ^ m x s b _ g _ h ^ g h j h ^ g u _ a Z ^ Z q b J b f Z g Z \ d e Z g Z [_ k d h g _ q g h k l b

Z $\Phi^+(t)=\frac{t^3}{t^3+9}\Phi^-(t)+4t-\frac{6}{t^2},\ t\in L;$

[$\Phi^+(t)=\frac{t^2(t-4i)}{2t-1}\Phi^-(t)+8t^3,\ \ t\in L;$

] ^ _ $L=\{t:|t|=1\}.$

L j _ [m _ l k y j _ r b l v g _ h ^ g h j h ^ g m x a Z ^ Z q m J b f Z g Z \ d e Z g Z [_ k d h g _ q g h k l b _ k e b _ _ d j Z _ \ h _ m k e h \ b _ b f _ _ l \ b ^

$$\Phi^+(t)=\frac{t}{t^2-1}\Phi^-(t)+\frac{t^3-t^2+1}{t^3-t},\ \ t\in L,$$

]^_ $\underline{L}$ - ijhba\hevguc ijhklhc aZfdgmluc]eZ^dbc dhglmj ke_^mx

Z dhglmj L kh^_j`bl \gmljb k_[y $z_0 = 0$ lhqdm kh^_j`bl $z_1 = 1$ lhqdb $z_2 = -1$;

[dhglmj L kh^_j`bl \gmljb k_[y $z_1 = 1$ lhqdb $z_2 = -1$ b g_ kh^_j`bl $z_0 = 0$ lhqdb.

Lj_[m_lky gZclb \k_ gZkq[_ adakb_ dmkhqgh ZgZeblbq_kdb_ nmgdpbb $\Phi(z) = \{\Phi^+(z), \Phi^-(z)\}$ k ebgb_c kdZqdZ $L = \{t : |t| = 1\}$ m^h\e_l\hjyxsb_ L khhlghr_gbx

$$\Phi^+(t) - t\Phi^-(t) - \left(\frac{1}{2} - t\right)\frac{1}{2\pi i}\int_L \frac{\Phi^+(\tau)d\tau}{\tau} = 3t^3 + \frac{1}{2}t^2 .$$

lmklv J_rbl_ ke_^mxsb_ djZ_\u_ aZ^Zqb Jb dmkhqgh ZgZeblbq_kdbo nmgdpbc h]jZgbq_gguo gZ [_kdhg_

Z $\Phi^+(t) = t^2\Phi^-(t) + t^{10} - \frac{1}{t}, \ t \in L;$

[$\Phi^+(t) = \frac{(t-5i)}{t^2}\Phi^-(t) - 2t^4 + \frac{8}{t^5}, \ t \in L;$

\ $\Phi^+(t) = \frac{t+3}{t^5}\Phi^-(t) + t^2 - \frac{2}{t^4}, \ t \in L.$

Сингулярные интегральные уравнения и их связь с краевой задачей Римана для аналитических функций комплексного переменного

1. >Zcl_ hij_^_e_gb_ h^ghjh^gh]h g_h^ghjh^gh]h bgl_
Nj_^]hevfZ-]h jh^Z
2. Qlh gZau\Z_lky kh[kl_ggufb agZq_gbyfb kh[kl_ggufb n
bgl_]jZevgh]h mjZ\g_gby Nj_^]hevfZ-]h jh^Z"
3. DZdh_ mjZ\g_gb_ gZau\Z_lky khxaguf k ^Zgguf h^gh
mjZ\g_gb_f Nj_^]hevfZ-]h jh^Z"
4. Knhjfmebjmcl_ ljb hkgh\gu_ l_hj_fu Nj_^]hevfZ h jZaj_r
mjZ\g_gbc Nj_^]hevfZ-]h jh^Z
5. Qlh gZau\Z_lky k_jldhc bgl_]jZevgh]h mjZ\g_gby Nj_^]hevfZ-]h jh^Z"
6. Knhjfmebjmcl_ l_hj_fm h ki_dlj_ bgl_]jZevguo mjZ\g_gbc Nj_^]hevfZ-]h jh^Z
7. Fh`_l eb aZ^Zgghfm kh[kl_gghfm agZq_gbx h^ghjh^gh]h
Nj_^]hevfZ-]h jh^Z khhl_lkl\h\Zlv [_kdhg_qgh_ fgh`_kl\h kh[kl_gguo nmg
8. Baeh`bl_ eh]bq_kdmx ko_fm j_r_gby bgl_]jZevgh]h mjZ\g_gby k
\ujh`^_ggufb y^jZfb"
9. >Zcl_ hij_^_e_gb_ ihegh]h kbg]meyjgh]h bgl_]jZevgh]h mjZ
10. Qlh gZau\Z_lky oZjZdl_jbklbq_kdhc kbg]meyjgh c qZklvx ih
kbg]meyjgh]h bgl_]jZevgh]h mjZ\g_gby k y^jhf Dhrb"
11. DZdh_ mjZ\g_gb_ gZau\Z_lky oZjZdl_jbklbq_kdbf kbg]
mjZ\g_gb_f k y^jhf Dhrb"
12. DZdZy k\yav f_`^m djZ_\hc aZ^Zq_c JbfZgZ ^ey ZgZ
oZjZdl_jbklbq_kdbf kbg]meyjguf bgl_]jZevguf mjZ\g_gb_f k y^jhf
13. < q_f khklhbl hkgh\ghc f_lh^ j_r_gby oZjZdl_jbklbq_
bgl_]jZevgh]h mjZ\g_gby k y^jhf Dhrb"
14. Knhjfmebjmcl_ ljb hkgh\gu_ l_hj_fu G_l_jZ h jZaj_rb
bgl_]jZevguo mjZ\g_gbc k y^jhf Dhrb

lmklv J_rbl_ ke_^mxsb_ bgl_]jZevgu_ mjZ\g_gb
]h jh^Z

Z $\varphi(t)+\int\limits_L\left(\frac{2t}{\tau}+5\tau^{-2}\right)\varphi(\tau)d\tau=3t+1,$

[$\varphi(t)-\int\limits_L\left(\frac{t^2}{\tau^2}+2\tau\right)\varphi(\tau)d\tau=t^2-\frac{1}{t};$

\ $\varphi(t)-\int\limits_L(\tau-t)\varphi(\tau)d\tau=5t^2-t^3-\frac{4}{t}.$

J_rbl_ ke_^mxsb_ oZjZdl_jbklbq_kdb_ kbg]meyjgu_ bgl_

Z $t(t-2)\varphi(t)+\frac{t^2-6t+8}{\pi i}\int\limits_L\frac{\varphi(\tau)}{\tau-t}d\tau=\frac{1}{t}$]^_ ;

[$(t^2-2)\varphi(t)+\frac{3t}{\pi i}\int\limits_L\frac{\varphi(\tau)}{\tau-t}d\tau=\frac{2t}{t^2+1},$]^_ $L=\{t:|t-2i|=2\};$

\ $t\varphi(t) - \frac{t-2}{\pi i}\int_L \frac{\varphi(\tau)}{\tau - t}d\tau = 2(t^2+1)$,]^ $L = \{t : |t-1| = 2\}$.

Imklv J_rbl_ ke_^mxsb_ bgl_]jZevgu_ mjZ\g_gb
]h jh^Z

Z $\varphi(t) + \int_L \left(\frac{\tau}{t} + \frac{t}{\tau}\right)\varphi(\tau)d\tau = t^2 - \frac{1}{t}$,

[$\varphi(t) - \int_L \left(\frac{t}{\tau^2} + 2\tau\cdot t^2\right)\varphi(\tau)d\tau = 4t + \frac{1}{t^2}$;

\ $\varphi(t) + \int_L \left(\tau^2 - t^2\right)\varphi(\tau)d\tau = t^2 - t^3 + \frac{1}{t}$.

J_rbl_ ke_^mxsb_ oZjZdl_jbklbq_kdb_ kbg]mey_jgu_ mjZ\g_gby

Z $t(t-2)\varphi(t) + \frac{t^2-6t+8}{\pi i}\int_L \frac{\varphi(\tau)}{\tau - t}d\tau = \frac{1}{t}$]^_ ;

[$(t^2-2)\varphi(t) + \frac{3t}{\pi i}\int_L \frac{\varphi(\tau)}{\tau - t}d\tau = \frac{2t}{t^2+1}$,]^ $L = \{t : |t-2i| = 2\}$;

\ $t\varphi(t) - \frac{t-2}{\pi i}\int_L \frac{\varphi(\tau)}{\tau - t}d\tau = 2(t^2+1)$,]^ $L = \{t : |t-1| = 2\}$.

Краевая задача Гильберта для аналитических функций комплексного переменного. Решение задачи Гильберта в единичном круге методом редукции к задаче Римана

1. Knhjfmebjmcl_ djZ_\mx aZ^Zqm =bev[_jlZ ^ey ZgZeblbq_]_ev^_jh\uo nmgdpbc b h^ghk\yaguo h[eZkl_c
2. DZdh\Z dhfie_dkgZy nhjfZ aZibkb djZ_\h]h mkeh\by aZ^Zqb
3. Imklv D^+ – dhg_qgZy h^ghk\yagZy h[eZklv dhfie_dkgh]h i_j_f_gg $z = x + iy$ h]jZgbq_ggZy djb\hc L. Mkeh\b_ dhgnhjfgh wd\b\Z aZ^Zqb =bev[_jlZ ^ey D^+ aZ^Zq_ =bev[_jlZ ^ey _^bgbqgh]h djm]
4. < q_f kmlv f_lh^Z j_^mdpbb \gmlj_gg_c djZ_\hc aZ^Zqb = nmgdpbc dhfie_dkgh]h i_j_f_ggh]h _^bgbqghf djm]_ d djZ_\hc aZ^Zq
5. Qlh gZau\Z_lky bg^_dkhf djZ_\hc aZ^Zqb =bev[_jlZ"
6. Baeh`bl_ eh]bq_kdmx ko_fm j_r_gby \gmlj_gg_c h^ghjh^ghc f_lh^hf G B Fmko_ebr\beb
7. >Zcl_ hij_^_e_gb_ nmg^Zf_glZevghc nmgdpbb aZ^Zqb =bev[_jlZ
8. Knhjfmebjmcl_ l_hj_fm G B Fmko_ebr\beb h jZaj_rbfhklb aZ^Zqb =bev[_jlZ \ _^bgbqghf djm]_
9. < q_f khklhbl hkgh\gZy kmlv j_r_gby \gmlj_gg_c g_h^gh =bev[_jlZ \ _^bgbqghf djm]_ f_lh^hf G B Fmko_ebr\beb"
10. Knhjfmebjmcl_ hkgh\gmx l_hj_fm h jZaj_rbfhklb \gmlj_gg_ =bev[_jlZ \ _^bgbqghf djm]_

11. Baeh`bl_ eh]bq_kdmx ko_fm j_r_gby \g_rg_c aZ^Zqb =bev
nmgdpbc dhfie_dkgh]h i_j_f_ggh]h \ _^bgbqghf djm]_

Lj_[m_lky gZclb \k_ ZgZebl b q_kdb_ \ $T^+=\{z:|z|<1\}$ nmgdpbb $\Phi^+(z)$, g_ij_ju\gu_ \ $T^+\cup\Gamma$ b m^h\e_l\hjyxsb_ gZ $\Gamma=\{t:|t|=1\}$ djZ_\hfm mkeh\bx

$$\mathrm{Re}\{\frac{1}{t}\Phi^+(t)\}=\frac{1}{2}\left(t+\frac{1}{t}\right).$$

Lj_[m_lky gZclb ZgZebl b q_kdmx \ $T^+=\{z:|z|<1\}$ nmgdpbx $\Phi^+(z)$, g_ij_ju\gmx \ $T^+\cup\Gamma$ b m^h\e_l\hjyxsmx gZ $\Gamma=\{t:|t|=1\}$ djZ_\hfm mkeh\bx

$$\mathrm{Re}\left\{\frac{t}{t-2i}\Phi^+(t)\right\}=t^3+\frac{1}{t^3}.$$

Imklv $L=\{w:\mathrm{Im}\,w=0\}$ b $C_+=\{w:\mathrm{Im}\,w>0\}$. GZc^bl_ ZgZebl b q_k
ihemiehkdhklb nmgdpbx $\Phi^+(w)$, g_ij_ju\gmx \ $C_+\cup L$ b m^h\e_l\hjyxsmx gZ L
djZ_\hfm mkeh\bx

$$\mathrm{Re}\left\{\frac{\tau-i}{\tau+i}\Phi^+(\tau)\right\}=\frac{3\tau^2-1}{(\tau^2+1)^2}.$$

Imklv D^+ – dhg_qgZy h^ghk\yaggZy h[eZklv iehkdhklb C_w dhfie_dkgh]h i_j_f_gghc $w=\xi+i\eta$ h]jZgbq_ggZy *улиткой Паскаля* L l_ aZfdgmlhc djb\hc, aZ^Z\Z_fhc iZjZf_ljbq_kdbf mjZ\g_gb_f \b^

$$w=\rho\left(e^{i\theta}+me^{i2\theta}\right),$$

]^_ $\rho>0$, $0<m<\frac{1}{2}$ $0\le\theta\le2\pi$. Lj_[m_lky gZclb \k_ ZgZebl b q_kdb_ \ D^+ nmgdpbb $\Phi^+(z)$, g_ij_ju\gu_ \ $D^+\cup L$ b m^h\e_l\hjyxsb_ gZ L djZ_\hfm mkeh\bx

$$\mathrm{Re}\{\overline{h(\tau)}\Phi^+(\tau)\}=q(\tau),$$

]^_ $h(\tau)=a(\tau)+ib(\tau)$, $q(\tau)$ – aZ^Zggu_ gZ L nmgdpbb dhkkZ $H(L)$, ijbq_f $h(\tau)\neq0$.

Imklv $T^+=\{z:|z|<1\}$, $\Gamma=\{t:|t|=1\}$ b $T^-=\overline{C}_z\setminus(T^+\cup\Gamma)$. GZc^bl_ \k_ ZgZebl b q_kdb_ \ T^- nmgdpbb $\Phi^-(z)$ g_ij_ju\gu_ \ $T^-\cup\Gamma$ b m^h\e_l\hjyxsb_ gZ Γ djZ_\hfm mkeh\bx

$$\mathrm{Re}\{\frac{1}{t}\cdot\Phi^-(t)\}=\frac{1}{2}\left(t^2+\frac{1}{t^2}\right).$$

JZaj_rbfZ eb \ _^bgbqghf djm]_ $T^+=\{(r,\varphi):0<r<1,\ -\pi\le\varphi\le\pi\}$ aZ^ZqZ =bev[_jlZ k djZ_\uf mkeh\b_f

$[5\cos\varphi+\sin 2\varphi]\cdot U(\cos\varphi,\sin\varphi)-[5\sin\varphi-\cos 2\varphi]\cdot V(\cos\varphi,\sin\varphi)=0$?

lmklv $T^{+}=\{z:|z|<1\}$, $\Gamma=\{t:|t|=1\}$ b $T^{-}=\overline{\boldsymbol{C}}_{z}\setminus(T^{+}\cup\Gamma)$. GZc^bl\k_ ZgZeblbq_kdbmgdpbb $\Phi^{-}(z)$ g_ij_ju\gu_\ $T^{-}\cup\Gamma$ b m^h\e_l\hjyxsb_ gZ djZ_\hfm mkeh\bx

$$\mathrm{Re}\{t^{-2}\cdot\Phi^{-}(t)\}=\frac{1}{2}\left(t^{2}+\frac{1}{t^{2}}\right).$$

Lj_[m_lky gZclb ZgZeblbq_kdmx \ $T^{+}=\{z:|z|<1\}$ nmgdpbx $\Phi^{+}(z)$, g_ij_ju\gmx \ $T^{+}\cup\Gamma$ b m^h\e_l\hjyxsmx gZ $\Gamma=\{t:|t|=1\}$ djZ_\hfm mkeh\bx

$$\mathrm{Re}\left\{\frac{t}{t-3i}\Phi^{+}(t)\right\}=t^{4}+\frac{1}{t^{4}}.$$

lmklv $\Gamma=\{t:|t|=1\}$. <uykgbl_ ijb dZdhf aGZq_gbb b bmil_gZj_gfgy yZ aZ^ZqZ =bev[_jlZ k djZ_\uf mkeh\b_f \b^Z

$$\mathrm{Re}\{t^{2}\cdot\Phi^{+}(t)\}=b\left(t-\frac{1}{t}\right)+\left(t^{2}+\frac{1}{t^{2}}\right),\ t\in\Gamma,$$

[m^_l bf_lv j_r_gb_ J_rbl_ aZ^Zqm ijb b.gZc^_gghf aGZq_gbb

lmklv $T^{+}=\{z:|z|<1\}$, $\Gamma=\{t:|t|=1\}$ b $T^{-}=\overline{\boldsymbol{C}}_{z}\setminus(T^{+}\cup\Gamma)$. GZc^bl_ \k_ ZgZeblbq_kdb_ nmgdpbb $\Phi^{-}(z)$ g_ij_ju\gu_\ $T^{-}\cup\Gamma$ b m^h\e_l\hjyxsb_ gZ djZ_\hfm mkeh\bx

$$\mathrm{Re}\{t\cdot\Phi^{-}(t)\}=\frac{1}{2}\left(t+\frac{1}{t}\right).$$

Методы решения краевых задач Дирихле и Неймана для гармонических функций двух действительных переменных в единичном круге

1. >Zcl_ hij_^_e_gb_]Zjfhgbq_kdhc nmgdpbb ^\mo ^_ckl\bl_ $M_0(x_0,y_0)$ ljb_^bl_ ijbf_ju
2. Dh]^Z nmgdpby $U(x,y)$ gZau\Z_lky]Zjfhgbq_kdhc \ D ? gZ fgh`_kl_
3. DZdZy k\yav f_`^m]Zjfhgbq_kdbfb nmgdpbyfb ^\mo ^_ckl ZgZeblbq_kdbfb nmgdpbyfb dhfie_dkgh]h i_j_f_ggh]h"
4. Knhjfmebjmcl_ ihklZgh\dm \gmlj_gg_c djZ_\hc aZ^Zqb >bjboe_]Zjfhgbq_kdbo nmgdpbc \ h^ghk\yaguo h[eZklyo
5. Fh`_l eb aZ^ZqZ >bjboe_ aZ^Zqb G_cfZgZ ^ey]Zjfhgbq_ h^gh]h j_r_gby"
6. Knhjfmebjmcl_ ihklZgh\dm djZ_\hc aZ^Zqb R\ZjpZ ZgZeblbq_kdbo dhfie_dkgh]h i_j_f_ggh]h \ djm]h\uo h[eZklyo
7. DZdZy k\yav f_`^m djZ_\ufb aZ^ZqZfb >bjboe_ b R\ZjpZ"

8. DZdb_ f_lh^u j_r_gby djZ_\uo aZ^Zq >bjbo_ b G_cfZgZ agZ_l_"

9. MdZ`bl_ ijZdlbq_kdb_ ijbeh`_gby aZ^Zq >bjbo_\uo b G_cfZgZ

8.9. Lj_[m_lky gZclb ZgZeblbq_kdmx \ $T^+=\{z:|z|<1\}$ djm]_ nmgdpbx $\Phi^+(z)$, g_ij_ju\gmx \ $T^+\cup\Gamma$ b m^h\e_l\hjyxsmx gZ $\Gamma=\{t:|t|=1\}$ djZ_\hfm mkeh\b

$$\mathrm{Re}\{\Phi^+(t)\}=t+\frac{1}{t}+1.$$

8.10. GZibrbl_ djZ_\h_ mkeh\b_ $u(x,y)|_{\Gamma}=2x^2-4xy$]^_ $\Gamma=\{(x,y):x^2+y^2=\rho^2\}$ \ dhfie_dkghc nhjf_

8.11. <gmljb djm]Z $0\le r\le\rho$ gZc^bl_]Zjfhgbq_kdmx nmgdpbx $u(r,\varphi)$, ijbgbfZxsmx gZ]jZgbp_ djm]Z $u|_{\Gamma}=\sin 2\varphi$, $-\pi\le\varphi\le\pi$.

8.12. <gmljb djm]Z $D^+=\{(x,y):x^2+y^2<\rho^2\}$ gZc^bl_]Zjfhgbq_kdmx nmgdpbx $u(x,y)$ ijbgbfZxsmx gZ]jZgbp_ $\Gamma=\{(x,y):x^2+y^2=\rho^2\}$ ke_^mxsb_ agZq_gby

$$u|_{\Gamma}=y^2-x^2-\frac{1}{2}y.$$

8.13. Imklv $T^+=\{z:|z|<1\}$, $\Gamma=\{t:|t|=1\}$. <uykgbl_ ijb dZdhf agZq_gbb b aZ^ZqZ G_cfZgZ k djZ_\uf mkeh\b_f

$$\left.\frac{\partial U}{\partial n}\right|_{\Gamma}=10b+t^2+\frac{1}{t^2},\quad t\in\Gamma,$$

]^_ $\frac{\partial}{\partial n}$ – ijhba\h^gZy ih \g_rg_c ghjfZeb d Γ, bf__l j_r_gb_. J_rbl_ aZ^Zq gZc^_gghf agZq_gbb b

AZ^Zgby ^ey kZfhklhyl_evghc jZ[hlu ijb\h^ylky \ ieZgZo i

6.

L _ d m s Z y Z l l _ k l Z p b y h k m s _ k l \ e y _ l k y g Z d Z ` ^ h f i j Z d l b q _
n j h g l Z e v g h] h h i j h k Z \ u i h e g _ g b y a Z ^ Z g b c ^ e y Z m ^ b l h j g h c j
^ h f Z r g _ c k Z f h k l h y l _ e v g h c j Z [h l u

I.

l _ j _ q _ g v \ h i j h k h \ i j b \ h ^ b l k y \ i e Z g Z o i j Z d l b q _ k d b o a Z g y l

II.

l _ j _ q _ g v i j Z d l b q _ k d b o a Z ^ Z g b c ^ e y k Z f h k l h y l _ e v g h c j Z [
i j Z d l b q _ k d b o a Z g y l b c

l j h f _ ` m l h q g Z y Z l l _ k l Z p b y h k m s _ k l \ e y _ l k y i h k j _ ^ k l \ h f i j h
\ u k l Z \ e y _ l k y i h b l h] Z f i j Z d l b q _ k d b o a Z g y l b c Z l Z d ` _ g Z
h [m q Z x s b o k y f Z l _ j b Z e h \ k Z f h k l h y l _ e v g h c j Z [h l u \ k h h l \ _ l k l \
l _ d m s _ f d h g l j h e _ m k i _ \ Z _ f h k l b b i j h f _ ` m l h q g h c Z l l _ k l
\ u i h e g b \ r b _ \ k _ a Z ^ Z g b y ^ e y k Z f h k l h y l _ e v g h c j Z [h l u i j _ ^ e h `
i j Z d l b q _ k d b o a Z g y l b c ^ e y Z m ^ b l h j g h c j Z [h l u a Z q _ l g h
h [j Z a _ p d h l h j h] h i j b \ h ^ b l k y g b ` _

I.

Образец зачетного задания

Примечание. *Во всех заданиях значение параметра* k *равно порядковому номеру студента в учебном журнале*

1. l m k l v T^+ - _ ^ b g b q g u c d j m] g Z d h f i e _ d k g h c i _ j _ f _ g g h c $z = x + iy$ l $T^+ = \{z : |z| < 1\}$ Z $T^- = \overline{C} \setminus (T^+ \cup L)$] ^ _ $L = \{t : |t| = 1\}$.
L j _ [m _ l k y g Z c l b Z g Z e b l b q _ k d m x \ T^+ n m g d p b x $\Phi^+(z)$ b Z g Z e b l b q _ k d m x \ T^- n m g d p b x $\Phi^-(z)$ - Z g Z e b l b q _ k d m x \ T^-, $\Phi^-(\infty) = k$ _ k e b b o] j Z g b q g u _ a g Z q _ g b y g Z L m ^ h \ e _ l \ h j y x l k e _ ^ m x s _ f m m k e h \ b x

$$\Phi^+(t) = t^{10-k}\Phi^-(t) + kt^k + (10-k)t^{-k}.$$

2. l m k l v T^+ - _ ^ b g b q g u c d j m] g Z d h f i e _ d k g h c i _ j _ f _ g g h c $z = x + iy$ Z $L = \{t : |t| = 1\}$ -] j Z g b p Z w l h] h d j m] Z L j _ [m _ l k y g Z c l b Z g Z e b l b q _ k d m x \ T^+ n m g d p b x $\Phi^+(z)$ _ k e b _ _] j Z g b q g u _ a g Z q _ g b y g Z L m ^ h \ e _ l \ h j y x l k e _ ^ m x s _ f m m k e h \ b x

$$\mathrm{Re}\{t^{-1}\Phi^+(t)\} = \frac{1}{2i^k}\left(t^{10-k} + (-1)^k t^{k-10}\right)$$] ^ _ i - f g b f Z y _ ^ b g b p Z

D j b l _ j b b h p _ g b \ Z g b y h l \ _ l Z g Z a Z q z l _

1. G h j f u h p _ g b \ Z g b y h l \ _ l Z

‹ i i	K l j m d l m j Z y q Z k l v [b e	D h e b q _ k l \ h [Z e
1	l j Z \ b e v g h _ j _ r _ g b _ a Z ^ Z q b	[Z e e Z
2	l j Z \ b e v g h _ j _ r _ g b _ a Z ^ Z q b	[Z e e Z

<hafh`gZ]jZ^Zpby \ b [ZeeZ

2. RdZeZ hp_gb\Zgby jZ[hlu

i i	Hp_gdZ	Dhebq_kl\h [Z
1	AZql_gh	3-5
2	G_aZql_gh	b f_g__

1. *Расулов К.М.* F_lh^u j_r_gby ebg_cguo djZ_\uo aZ^Zq mlhqg_gby ihkh[b_ ±Kfhe_gkd ©Mgb_jkbl_lk ª
2 *Расулов К.М.* F_lh^ khijy`_gby ZgZeblbq_kdbo nmgdpbc b g ijbeh`_gby ±Kfhe_gkd Kfhe=M

3. *Агошков В.И., Дубовский П.Б., Шутяев В.П.* F_lh^u j_r_gby aZ^Zq fZl_fZl nbabdb ±F NBAF:LEBL
4. *Бицадзе А.В.* Hkgh\u l_hjbb ZgZeblbq_kdbo nmgdpbc dhfie_dkgh GZmdZ
5. *Гахов Ф.Д.* DjZ_\u_ aZ^Zqb ±F GZmdZ
6. *Зверович Э.И.* Ebg_cgu_ djZ_\u_ aZ^Zqb l_hjbb ZgZeblbq_kdbo ±Fbgkd ±E=M
2015.
7. *Мартинсон Л.К., Малов Ю.И* >bnn_j_gpbZevgu_ mjZ\g_gby fZl_fZlbq_kdh F F=LM bf G W ;ZmfZgZ
8. *Мусхелишвили Н.И.* Kbg]meyjgu_ bgl_]jZevgu_ mjZ\g_gby ±F GZmdZ
9. *Мусхелишвили Н.И.* G_dhlhju_ hkgh\gu_ aZ^Zqb fZl_fZlbq_kdhc l_h - F., GZmdZ, 1966.
10. *Прусов И.А.* >\mf_jgu_ djZ_\u_ aZ^Zqb ±Fbgkd ±Fbgkd djZ_\u_ aZ^Zqb k
11. *Расулов К.М.* DjZ_\u_ aZ^Zqb ^ey ihebZgZeblbq_kdbo nmgdpb ijbeh`_gby ±Kfhe_gkd Kl=M
12. *Heinrich Begehr*. Boundary value problems in complex analysis I // Boletin de la Asociacion Matematica Venezolana. Vol. 12, No. 1 (2005). ±P. 65-85.
13. *Heinrich Begehr*. Complex analytic methods for partial differential equations. ±Singapure: World Scientific Publishing, 1994.

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- Kbkl_fZ ^bklZgpbhggh]h h[mq_gby Kfhe_gkdh]h]hkm^Z http://cdo.smolgu.ru
- We_dljhggZy [b[ebhl_qgZy kbkl_fZ mgb_jkbl_lZ http://biblioteka.smolgu.ru
- GZpbhgZevguc hldjuluc mgb_jkbl_l http://www.intuit.ru
- H[jZah\Zl_evguc fZl_fZlbq_kdbc kZcl http://exponenta.ru
- H[s_jhkkbckdbc fZl_fZlbq_kdbc ihjlZe http://www.mathnet.ru

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ljb hkms_kl\e_gbb h[jZah\Zl_evgh]h ijhp_kkZ ih ^bkp bgl_jZdlb\gZy ^hkdZ ijh_dlhj Hkms_kl\ey_lky WMW-kd b ijhkljZgkl_ jZ[hlu ih ZgZeblbq_kdbf b j_kmjkZfb k_lb Bgl_jg_l
>ey hkms_kl\e_gby h[jZah\Zl_evgh]h ijhp_kkZ ih ^bkp bf__lky ke_^mxsZy g_h[oh^bfZy bgkljmf_glZevgZy [ZaZ

ijh_^_gby ijZdlbq_kdbo aZgylbc dhfivxl_jguc deZkk h[hjm
W<F k g_h[oh^bfuf fZl_fZlbq_kdbf khnlhf b \uoh^hf \ Bgl_
ijZdlbq_kdbo aZgylbc dZ[bg_lu h[hjm^h\Zggu_ ijh_dlhjZfb
^ey ijh_^_gby e_dpbhgguo aZgylbc Bf__lky dZ[bg_l dk_jhd
ijbgl_j ^ey ih^]hlh\db bg^b\b^mZevguo ^b^Zdlbq_kdbo fZl_jb

9.

>ey hkms_kl\e_gby h[jZah\Zl_evgh]h ijhp_kkZ bkihevamxlky
\uqbkebl_evguc p_glj fZl_fZlbq_kdh]h nZdmevl_lZ lheh`_gb
ml_j`^_gh ijbdZahf j_dlhjZ ‹] \dexqZxsbc dhfiv
deZkku hkgZszggu_ \uoh^hf \ bgl_jg_l b kbkl_fhc dhfivxl_j Wolfram
Mathematica \ l_dms_c fh^bnbdZpbb
ljh]jZffgh_ h[_ki_q_gb_ Microsoft Open License (Windows XP, 7, 8, 10, Server,
Office 2003- Ebp_gaby hl h[gh\e_gb_ jZa Microsoft
Open License (Windows XP, 7, 8, 10, Server, Office 2003- Ebp_gaby
h[gh\e_gb_ jZa Dr.Web Server/Desktop Security Suite :glb\bjmk
Ebp_gaby EB4E-QN5S-6FG2-N76B ?`_]h^gh_ h[gh\e_gb_ Kaspersky Endpoint Security
^ey [bag_kZ Kl Zg^Zjlguc Ebp_gaby FB