



基于RailSys平台 的轨道交通 实验与仿真

主 审 徐玉萍
编 著 陈 宏 徐国权

JIYU RailSys
PINGTAI DE GUIDAOJIAOTONG
SHIYAN YU FANGZHEN



江西高校出版社




基于RailSys平台 的轨道交通 实验与仿真

JIYU **RailSys**

PINGTAI DE GUIDAOJIAOTONG
SHIYAN YU FANGZHEN

主 审 徐玉萍
编 著 陈 宏 徐国权



江西高校出版社

! " # \$ % & ' ! " # () *
 " # \$ % & ' () * + , - . / + 0 1 2 3
 4 5 6 7 , ! 8 9 : ; < = > ? @ A 2 -. / 0 , / -
 "(12 34564670386-3046-
 ! , " " " # , " 0 " \$ 3 " % , " ' () * 6.
 / B C 6 D E F G & , " 9 6 8 3
 H 4 @ I J ! K ! "# L M N O P -. / Q R - 3 4 - 0 : S

! " # \$	ABCD! " %
% &	ABEFGHI J KLM3: >
' () *	88..0:
+), - .	N.43/0557.08/3
/ O - .	N.43/0557/80/4
1 &	;;;,<=%?,>@A
2 3	PQHPRSS; * 23TUVW
4 5	ABXYZ[TUVW45\
6 /] ^ _ ' = a
7 8	454AAB/.3-AA /+/:
2 9	//
:	; -5. b:
" <	-./0 c /- de /" e /< 23
= >	"(12 34564670386-3046-
? @	8,.. Y

f " gh: 6.46-. /06:58
 ! " # \$ % " & '

\$ % &

! " # \$ % & ' () * + , - . / 0 - . 0123 123456789: ; < = > ? @ A - .
BCDEFGH; < = > # I J K J L M + ! N O O P M + ! ' Q R J L ! S O ' T - . ! - .
UVWX! ' Q R Y Z [W X ! # \$) * + \$ & , \ & / ^ _ L ' ! a b c d e f g 2 h S O ' Q
\ i j ! k & g 2 h S O ' Q \ i j l m - . 0123 n & / o p q \ r s "
! " t u v w > x y z { ! / } x ~ ; < = > ! " # \$ % \ ? @ & ' () 3 t u v ;
< = > Q % + , - . / 0 \ 1 2 s "

' (

%&' (u v # w x y K z { } * + , q | { } ~ ! ' (" # \$ % & ' () * + ! , - !
. / ! O g 1 8 2 3 4 q 5 6 \$ 7) 8 9 : ; O < x x = K | { 8 > ? @ \$. / q A B K C
D E F G } K H I u e \$ J K L M v x N . / } I O "

%&' (8 > P Q) # w I R K ! S T K ! U } K M V P Q \$ W u X Y Z [J W \ ^ L
] + ^ _ ' a P K S T H ! < 5 u X Y Z K I R H \$ b] ~ c R d G H J e K f ' \$ g h < 5
' u X Y Z c i j e k l m n Z % o 9 p d q r \$ K s e > ? P Q N t u v 1 Z w x y z o
9 q r \$ w) { | w x # } y z K v ~ ! " w " % & ' (8 > > ? P Q) (Y + - q . # #
w \$ L P Q K / % & ' (? 0 K P Q \$) * e + / % Z ? 0 P Q K , ! o 9 / - 0 1 \$ b . /
Z + P Q ' O x 1 G X Y 2 K I R 9 v o 9 3 4 q 5 { K 8 K \$ 7 # 6 7 8 9 ! : ; < ! = >
? ! T n s @ ~ A B # P < C D "

E' " \$ F G , \$ H ' I \$ J K L y (M P Q > ? g N O ~ ! P Q / \$ L 8 > P Q K 5
W N O * e R S T c \$) U h 5 i c z { K R S 7 B " / 8 9 v V \$ W X Y 6 Z Z \$ L 8 >
P Q > ? K u ? [\ K > ? r Y) R c \$ % c] u 7 ^ K 6 _ x ' a b } I R C K \$ L 8 >
c d / - P Q - . // 1 2 3 e f g y h i l j K % & ' (> ? r Y 5 6 7 8 9 . ; < ! k l m n = // . }
I K \$ L > ? r Y ? // 4 5 6 7 8 9 o b 9 ' x p g e) R c \$ _ a K ! q r s t 6 \$ u v F w r
H < x % & ' (K x - C D \$? r Y ' % & ' (8 > P Q K + - ! y R q ? z { l c K d e
| & | } ~ \$ J K 6 ! { " # # 8 L \$ t % _ a r Y g e q d e K ! q \$ b A } y N ' I & g
e c ' " u c] () * "

8 !) L \$ + r , - * e - . // 1 2 3 o 9 % & ' (P Q > ? q 0 1 K L X ! q \$ + ! . 3 v
_ # \$ \$ / O 7 w i j 1 3 " % c \$ # \$ 2 r K) , - * e - . // 1 2 3 o 9 % & ' () * + ,
+ - . / K) 8 ~ ! \$ 3) + ! K) * \$ 4) - . // 1 2 3 K Q \$) 8 5 u 6 7 8 " 3 \$) 2 r , -
* e - . // 1 2 3 . # 4 5 5 6 9 ' I 5 : ; / % \$ b < v) * . # < 5 = %) > 7 6 G < 5 K
? P - P 8 " 7 \$) + r * e - . // 1 2 3 + - % & ' (8 9 : K ~ ! 8 " ; \$ t % , - ' - . // 1 2 3
c o 9 < 5 8 = > ? 8 " @ \$ @) t % , - * e 9 A K < 5 8 = > ? k B o 9 C O C D \$ D K
v E = # } y z K > ? C D F 2) * 8 " E \$ G " _ \$ @ | { t % ' E " R S X Y 2 Z < 5

!

) * -. /0123 +, -. /0123456

8 9 K [\ > ? 0 1 " v A J H I N J v 1 g e -. /0123 r Y \$ < o ' " _ # \$ c L \$ Z % C
D f g h / K o 9 5 z D t % " < L \$ A J I I I N M d g { -. /0123 r Y ' > ? Y Z c N
Y K E " k l ! O P m n Q R \$ < o S ' i j # ! 3 c 3 T 1 N 5 } U V W K k l m n K o X
Z Y \$ b A J Z ["

+ ! [\] ' (} I % & ' (I j K ^ _ ! ' x a b c S d " e \$ % c K " # ! 3 ! ; ! Q !
] \$ q + 1 i j [^ _ " e \$ 7 ! @ ! E ! ! ! _ ! _ # \$ [' x a " e \$ + ! [\] ' (} I
% & ' (I j f j g ' h i { j ' k l T c m n o 9 5 o p "

/ L \$ v -. /0123 q r c x s ' g K t u e v (w y h 6 x y z] + y z K { | . g S
v < o Q } 5 } O ~ ! \$ < #) (R " # \$ % & [J u l [\ 6 x ' 7 ! (\ () \$ c j
* f ' + D q k l \$ - S 9 q H I . C 6 M &

! " #

" & ! \$ \$! " %

! " # \$ % & ' () * + * , - . / O

! " ! " # \$

" # \$ % & ' () * + , - . / # \$ % ' () 0 1 2 3 4 5 6 7 8 9 : ; < = > ! 4 ? " #
\$ @ , - B C D E F % & 1 2 3 4 7 8 9 : G H 6 " 7 " I J K L M N O G P Q L R S T U
V W X @ B C Z [\] ^ _ / G ' a 9 b c d @ F e 7 " G A / f g @ i j k # l G '
a 9 b m \$!

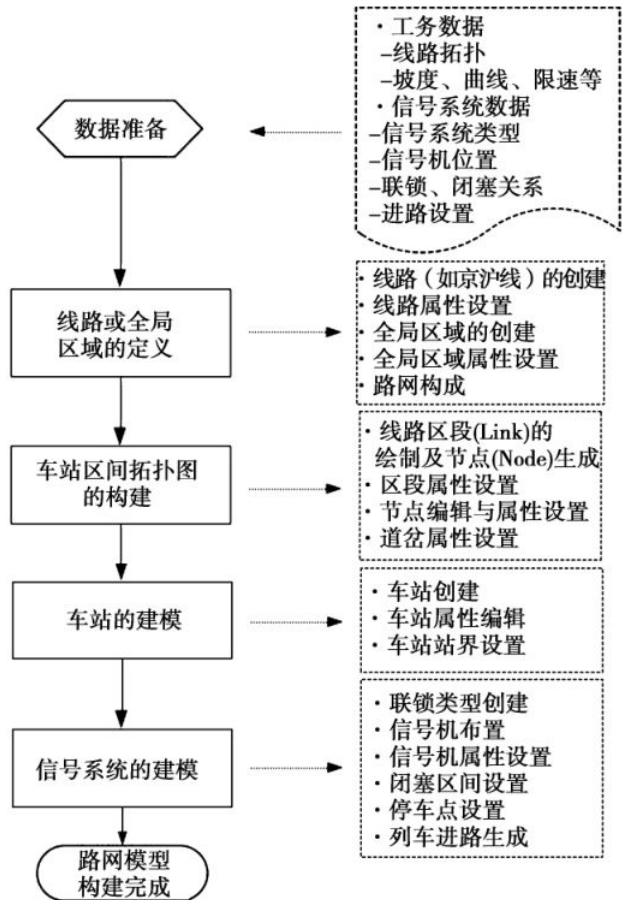
* " ! " % & ' ()

* " ! ! " # \$ % & ' () ! * + ,

" # \$ % & n o p q 1 2 3 4 7 8 9 : G = > @ s 5 6 l J @ t M N O G P Q L R S
V W @ v w o n x G [y z { @ | } 7 8 ~ 9 ! " # \$ % & !
7 8 9 : > ' % & () [y G * + , w D - . W / O 1 2 3 O 4 @ w = ? 5 % & 4 6 7
z { 8 k 9 9 : [; < = > ? @ A 9 9 B C > O * + D = 9 9 B C = > 9 9 - . W / = > E
F G H @ ? 5 K L I G G J K D L M G z { N O ! + ! L P !

* " * - . / O

" # \$ & Q , - n o R F S T G [y w U @ [y W X M (Y , - . F B C " ! Z : [K L
! F < = > @ [z { \] ^ _ ' ! # \$ n o a @ - M _ 3 " # \$ L = b G x F \ 5 c d @
' (() 7
d ! e [y G * + , w () 7 f g " h i j k - l X !
d * e [y : [G - . W / z { !
d / e [y G " # " % & - l !



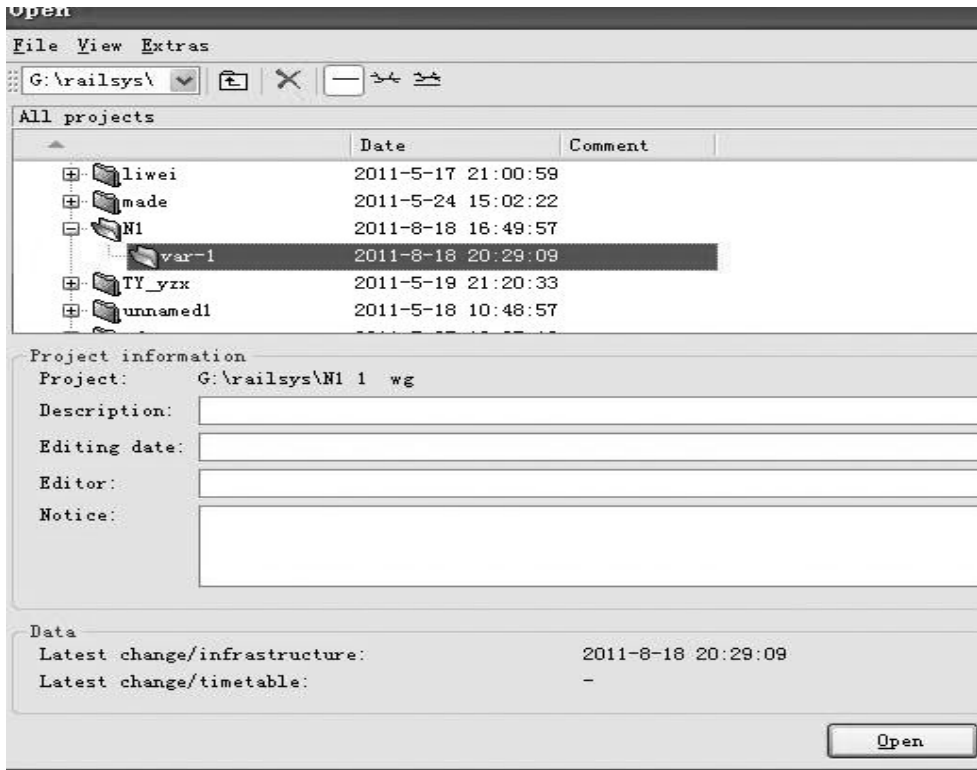
*!+! +, -. /01234

/"! " 56' 789:

/"! 1,) 2(345

7 8 9 b = > %& \ 7 8 9 : m Q n > o n o ! 6 n o R F [y G 7 8 9 : > ' G w
= @ V / p q M & D = R F \ 5 @ r G z { s (Y | V \ 5 t !

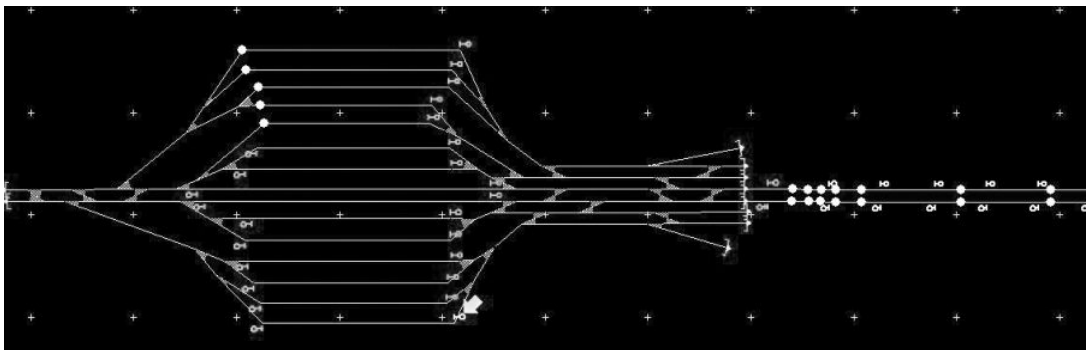
u v w T x t G 0 % 1 ! 2 1 3 y z @ { | G 0 } > ~ t ! " # \$ % & ' d 4 5 6 7 1 8 9 e 9 9 9 2 !
K L (' R F 7 8 9 :) * ' d ; 5 \$) 9 5 = 8 9 = 5 1 > \$ % \$; 9 e 6 ! + D = B R F , G \ 5 2 ! @ a k L
r G - . s | 2 ! t n o ! / 0 " 1 2 W / 3 @ 4 5 6 7 8 9 : D = G \ 5 @ N O ! + * L
P @ < : D = G \ 5 2 ! p G 7 8 9 :) * ? \$ 5 + ! @ u v # @ A 1 ; \$ y z @ + 5 8 9 \ 5 2 ! !



* !+* ; 4\$ < 2' =>

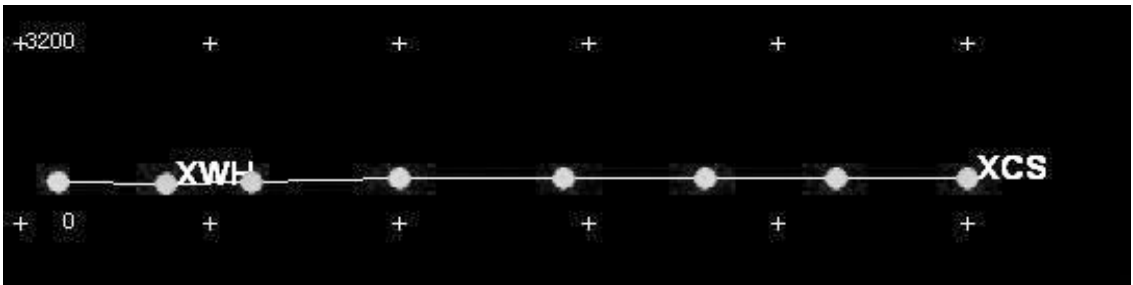
/"* 678' (%

[y G * + , w) * | [y ~ \ BC \$ > O = o G R S V W y > O ! # \$ % ' () t @ y G
 * + , w 5 4 ? ? @ D A @ 2 H B ~ C | { D ! ? @ E O t 5 K F G H @ I I R Z : [> J
 K O G * + V W ! N O ! + / 6 L R B C G ? @ * + E O !



* !+ / ? @ A B C D E *

MRH) | ? @ E O 7 8 ~ _ < { D G A @ * + E O @ % & C | 5 B C K O G N 7 V W @
 / O a k q B P < [Q G 9 ! R S ! N O ! + , L P !



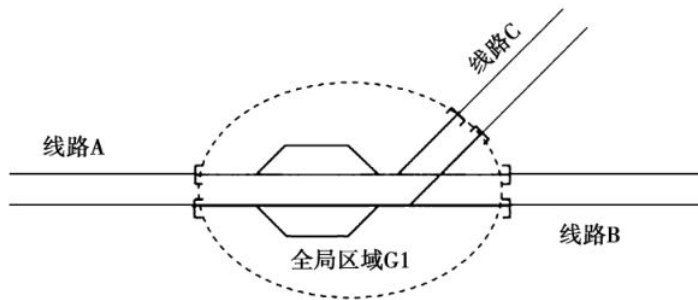
* !/, ?@FBCDE*

" O4%&n o : [G@AL 5 6 l J Gr s @ i n o [y TUGw = !

/// 9: 3; <=>) 2(?@

///! &' () * +, - . / (O 1

#S%O t G : [d B% A % & 0 VO# l [y t G n x Z [: [d N W X : e ; e t G R
 O 4 ! Y Z > ? % & / O N 7 2 Z ; [2 Z K ~ G : [@ R \ 3 ' B C | = > 3] 5 ^ 9 !
 6 < = > ? @ f _ ' / 4 a b w = [y > ' ! | #S%O t c d G : [O c S 6 7 N 7 @
 S 4 ? Y Z > ? M N 7 @ = o Z [y > ! N O ! / . L P ! : [C ' D ' E 4 ? < = > ? F ! M N
 N 7 @ w o [y !



* !/, GHI J

f g l @ A n Y Z > ? a @ n M & 0 < = > ? L N 7 G : [; < 4 i @ M V m ? < = >
 ? G : [4 i k < = > ? !

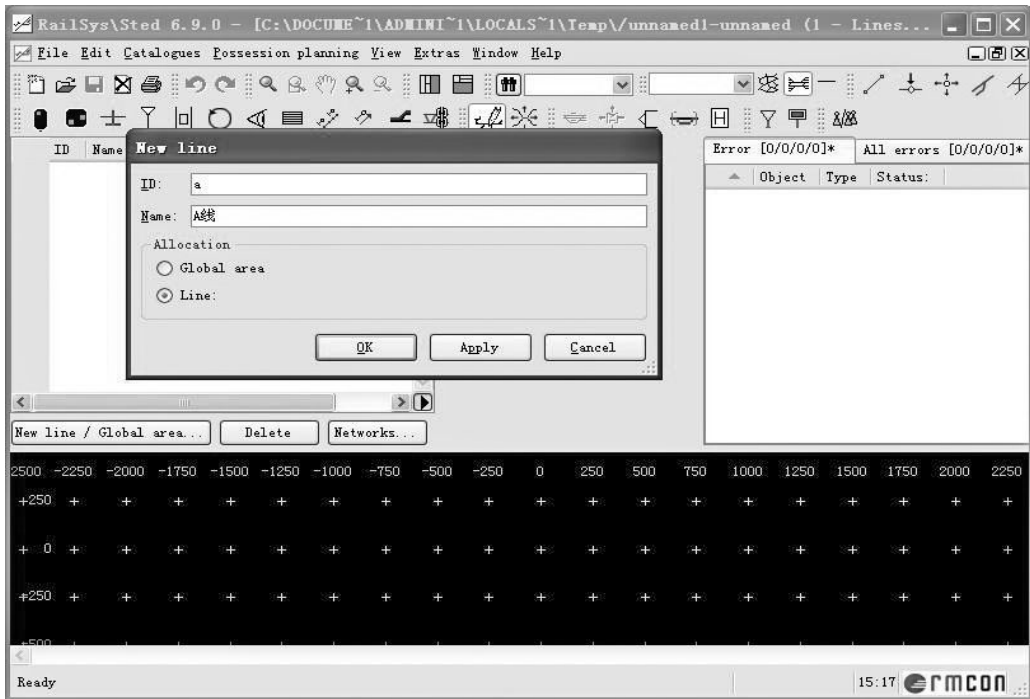
///"* &' - 23

uv%l m \ j x n k G 213 1GF@HS&\$51\$ p O q @ + 5 ; \$: [G < = > ? D
 = > ~ !

: [D = G % & G H N p 7

!@A: [

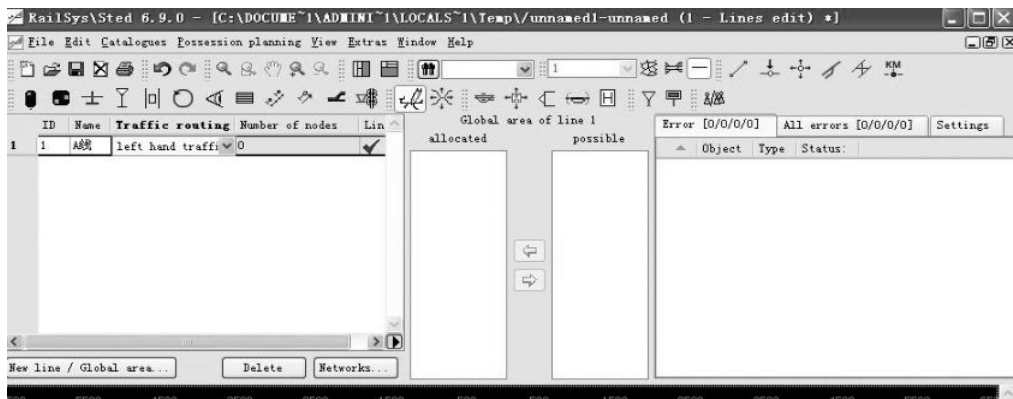
uvl m r S n t G # 213 1GF@HS&\$51\$ \$ y z + 5 { | N p O L P G : [D < = > ?
 r S 0 } T @ 0 } T t # \$: [G r . d : A 999 o S \$ K L : [G ' s l 2 S J 1 999 o C : p @
 T v y z # C A A & \$ [# @ K \$ y z @ D = B R Z , G Z [: [! N O ! / L P !



* !+L KLMH

*r s : [l J

NO!+M LP@ [nkr RFI J t. #N5\$<48 56=9% 0\$+< Bf u; %@/wxyRz
 6{ < Bd #%OP9 P\$; Q 95\$<48e @ x 6 } < Bd B1-9 P\$; Q 95\$<48e @- } Mr s } %l J 6 B1-9
 P\$; Q 95\$<48!



* !+M NOMHPQ

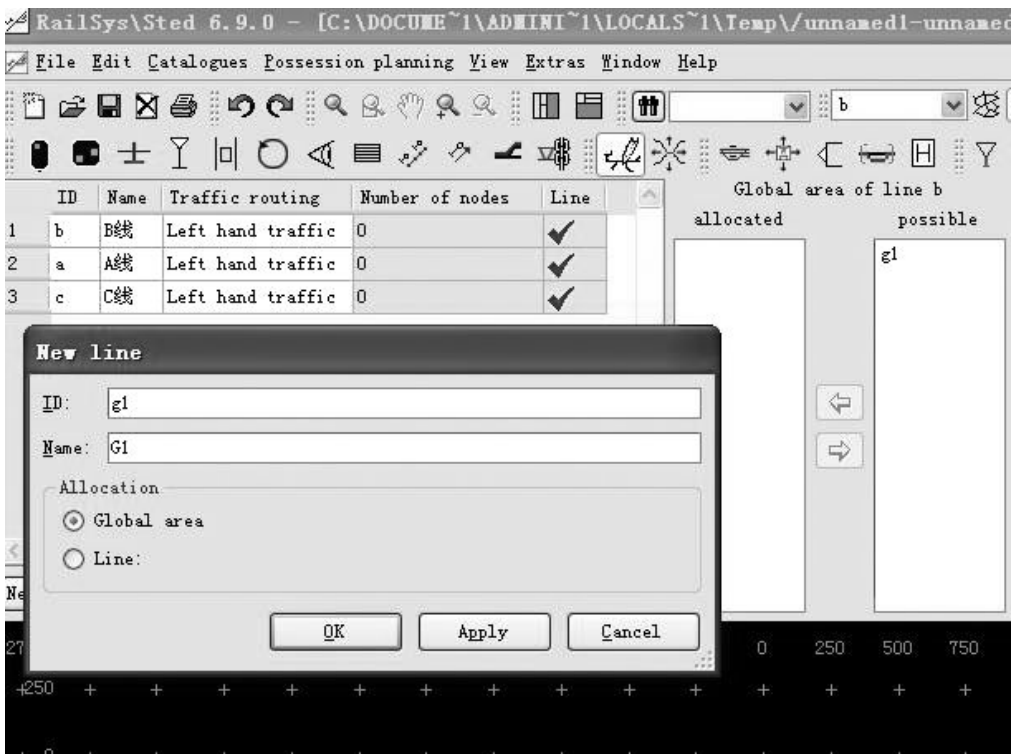
/! " ~ # - . @@@AD: !

, "N\$: [G9! r %&5K' (RZ: @ l mr Snt; t) @GRF; ' F: [@
 y#l 1&191 \$yz +5! f g7N\$: [^* +' (, c05/ !

/"/ / 45+, - 23

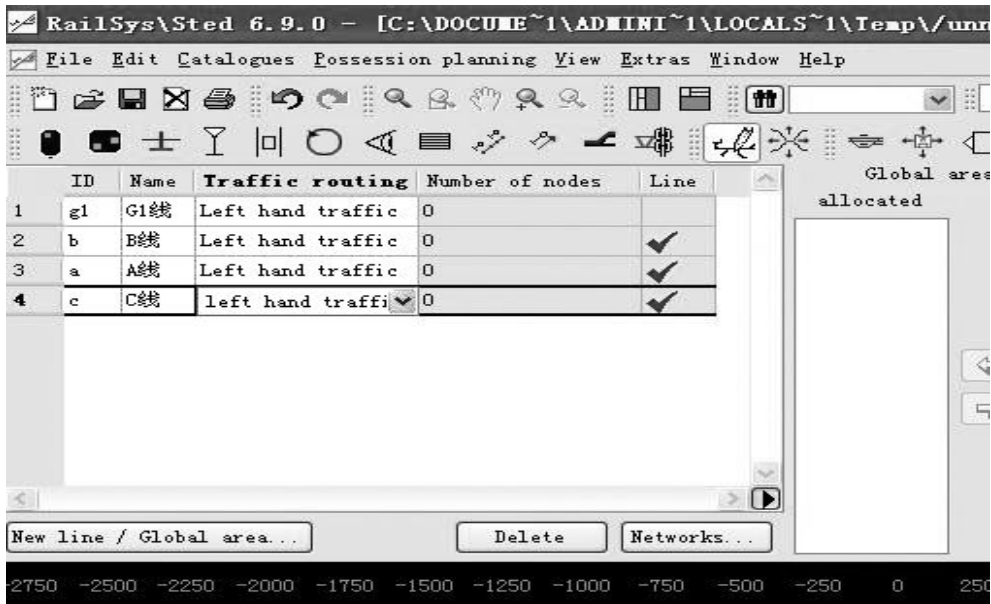
!"YZ>?D=

y - : [D= f g @ #213 &% 1\$ mt ; . #F&6H\$& \$51\$ \$ % @ # \$ r . 999o0! \$D
' s999oF!p/ NO!+R LP7



* !+R RSTU<2

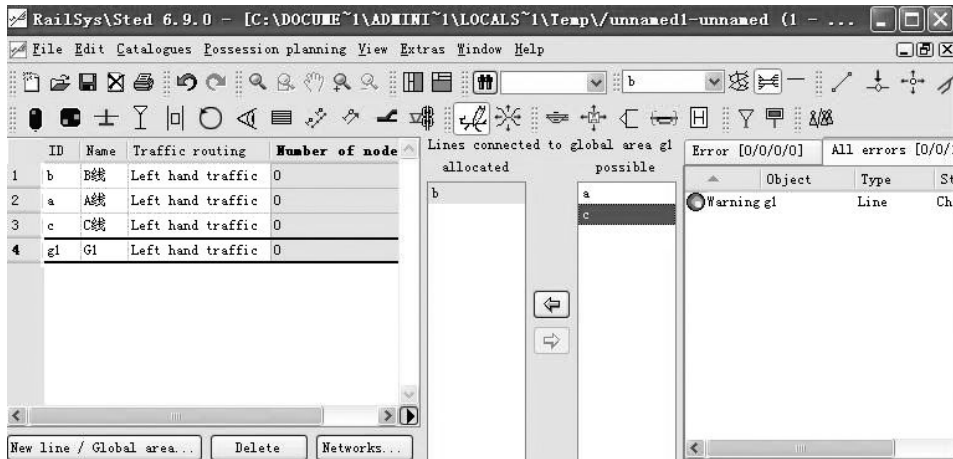
*"Tv#@K\$yz O{ | NO!+\$ LPG 1k@ I mr S nt / 234q5{ DGCP
) RZ: [!



* !+S RSTUMH

/"YZ>?Gi!

| I mrSntuv :l 6 0! GYZ>?d F&6H\$& \$51\$e @ ? #A6))%H&1\$ m; t MVG : [@NO!+!TLP7: [r. 6 &""(G6Z: [l OcdG2FI m@S&68\$91Q\$ mC PMV: [^4i kYZ>?GI m@A6))%H&1\$ mCP7bZd S ^4i G: [G :! ! yp yz +5j ; tG: [4i kM& 4i GYZ>?@ O: [' 8^4i kYZ>?)!@] 5; tr. 'yp yz +5j 4i kYZ>?G: [; <! , 4i !



* !+!T RSTU\$VW

_P7{ I m_PG Warning 4 CP: ; YZ>?h<r = bBC@M| a =GH? 5 t = bMVGBC+ 5!

/" , AB3=CDE67F) ' (

BC\$>0 * +OGw = sM& = b| : [; YZ>? ^D= no G>_p @ no : [GD= Ka@+ 5D= : [>J d B% Ue ?@ud 26Q1e KL 2 A@=o RF7 " G[y * + , wo! | } 7 8 ~ @@ABCI J @ / C^ , BCO4(BCD@BBo B BC!

: [>J d B% Ue \$@ud 26Q1e G @ANp 7

: [>J d B% Ue | ?@> ~p * \ 2F@uL =o GRZ: @_L D@ud 26Q1e 8) * 2

Z B% U G3 Eu@& r Np EHFG7

" 2Z; 2ZK ~ B% U G3 Eu#

" B% U ~ GI g; J: KQL-) MG u#

" - . NO! u!

f g7dR B% U ~ GLr l J sV V) MdG@ l J GFG- l P / , " !

/" , " ! & ' + 67B% U8- 23

d!e pquv l mt \ j x d VO% % U)e Oq@+ 5; \$: [>J d B% U)e GD= > ~! NO!+!! LP!

d*e| : [>J d B% Ue r Sntuv#213""\$yz + 5{ | p RFG r S l md E51\$ % U)e @N!+!* LP@ OBr S l mt / Qquv2FR! ; [2F@u@% U G Cv u5 9! | 6FR! 7

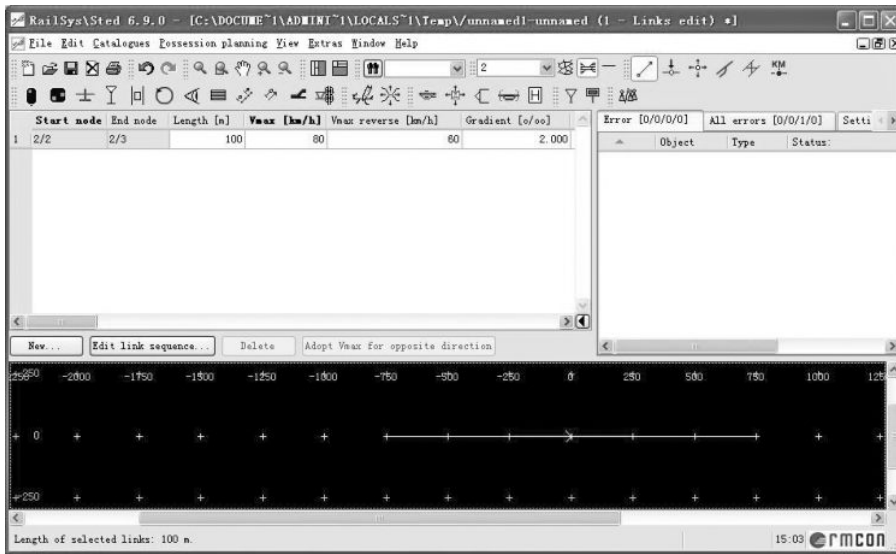
" J gSTU!

" : V| G B% U Wu!

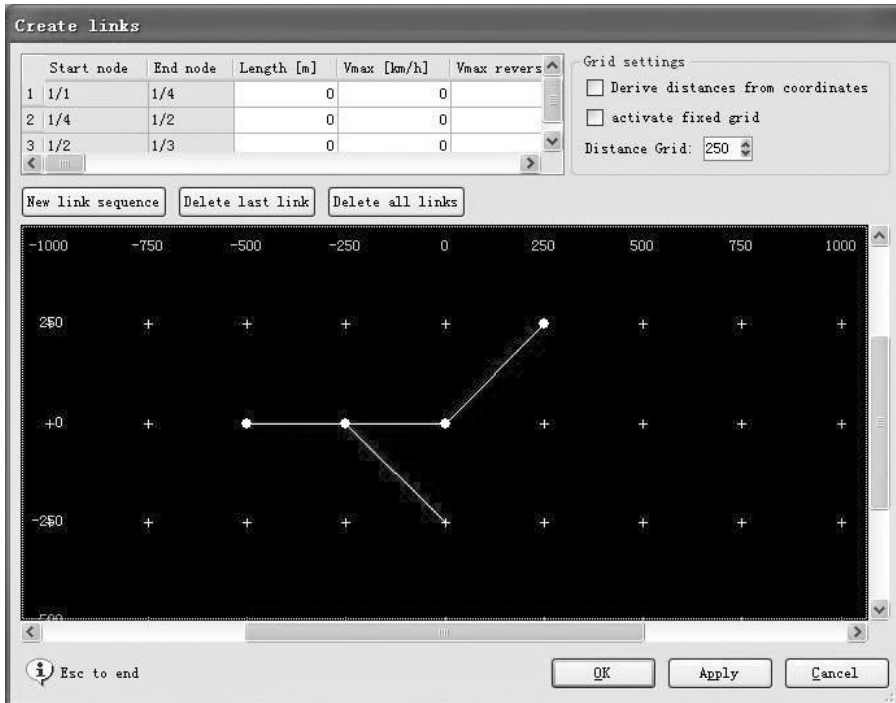
" : V| G B% U t O J Ru!

yZd 9 ! n B% U CuK L v u+5D= RZ B% U! uv#| 1&191 &\$)9 B% U \$yz @5'

(K>LD= G : [> J d B% Ue H N \$ X' (L r G : [> J d B% Ue e M u v # | 1 & 1 9 1 \$ && B% U) \$ y z !



* !+! MHTX<2YZ



* !+!* MHTX<2

d/e | r S I m d E51\$9 & U)e t r R F C Y x @ 5 K h ~ k G C Y x t 9 ! M V G B % U
I J ! N O ! + ! / L P 7

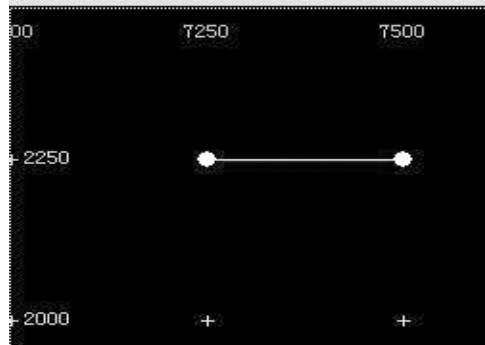
Create links

	Start node	End node	Length [m]	Vmax [km/h]	Vmax reverse [km/h]	Gradient [o/oo]	Profile 1
1	2/1	2/2	100	82	80	-2.000	
2	2/2	2/3	100	80	60	2.000	
3	2/3	2/4	100	80	60	0.000	

New link sequence Delete last link Delete all links

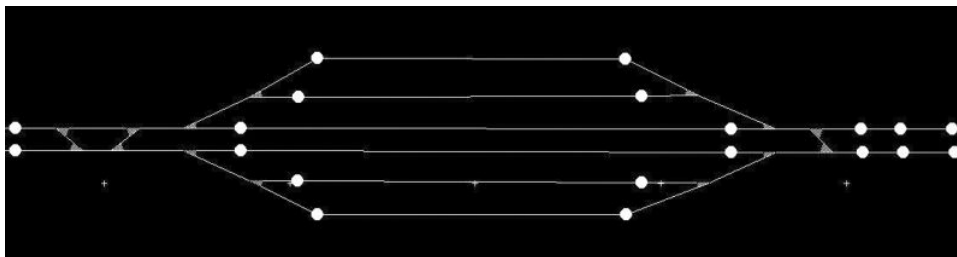
* !+! / B % U P Q - W

d , e | r S I m d E51\$9 & U)e t @ B % U G D = ? 5 t e M y Z # E 5 & \$ [D \ x : [> J
d B % U e f u @ Z #) P % 9 \$ [D] B % U G ^ _ : \$ ' 6 : ! N \$ X 9 ! ; . G : [> J d B % U e
f g \$ | O t G M V a b c g o d a @ M 0 activate fixed grid ; < q 5 @ G e f a b \
x e M | # I % 9 ; 8 1 F 7 0 \$ \$! M V g @ N Distance Grid: 250 9 ! * . T 3 C P } O t I F Y h
G f i j * . T k @ N O ! + ! , t L I U : [G # | f g 6 * . T k !



* !+! , M H [\

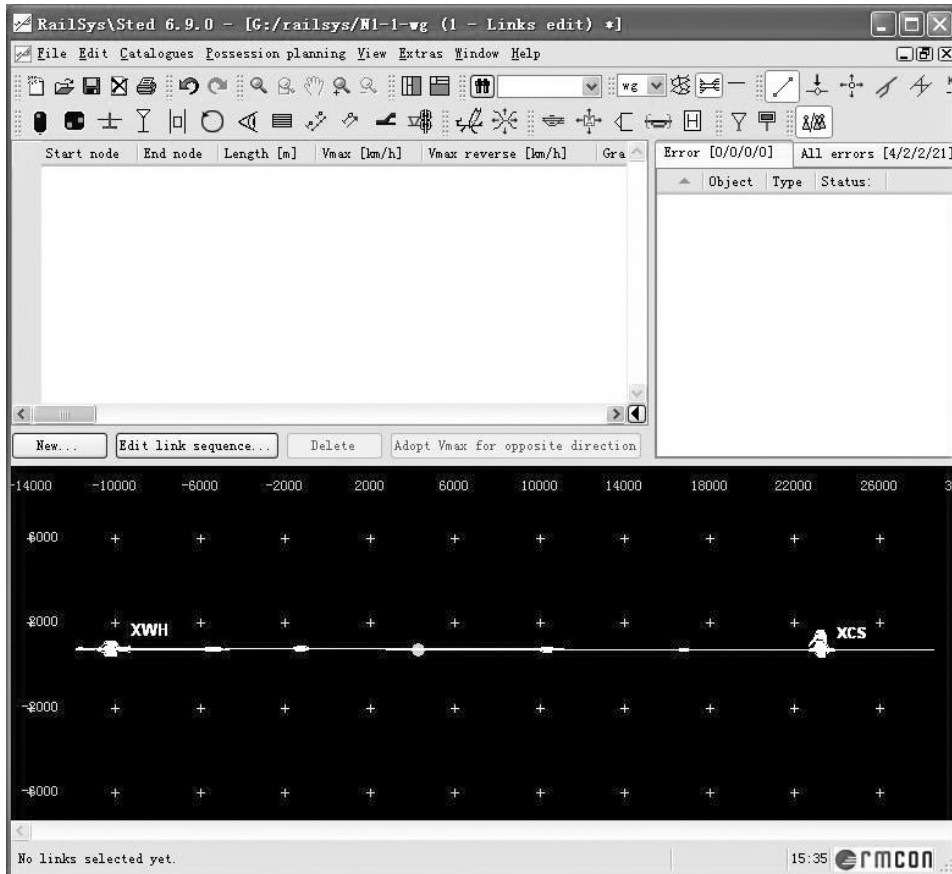
d . e 9 ! n L r G : [> J d B % U e @ # \$ M V G m z g + 5 n o B C \$ > 0 * + O G
w = ! N O ! + ! . + 6 w = G S T G B C \$ > O G * + O !



* !+! . ? @ ' T] C D *

/" , " * &' + 67B% U8 - 9 : ; <

: [> J d B% Ue | J r s r 2 H f ~ 7 T n B% U I J r s D o = B% U I J r s ! " # \$ t @ q ; < T n G B% U I J r s @) B% U I J r s G 7 " f g @ % & G H N p 7 d ! e p q | \ j x t u v y z @ # \$ % ' () 7 8 9 : > o w T x p k O { | B% U G r S n ! N O ! + ! L L P !



* ! + ! L B% U ^ _ ' ,

d * e ; t ~ O d B C \$ > O * + O e t G M V G R Z : [> J d B% U e @ N \$ M & ; t E Z : [> J d B% U e @ 5 K y Z E 9 5 & [! : [> J d B% U e I m r S n t O { | M V G : [> J I J @ N O ! + ! M L P @ t B 6 F : [> J d B% U e @ p v e t G R Z : [> J d B% U e @ B C \$ > O * + O t G : [> J d B% U e O | O B I m t q P M V G r 3 s t ! | : [> J d B% U e I m r S n t r M V G 5 H I J @ N p L P 7

- # # ' 9 \$ 5 9 ; 6 Q 1 p / > B% U C u @ u G @ u r . @ z c & r s } | J !
- # # V ; Q ; 6 Q 1 p / > B% U v @ u G @ u r . @ z c & r s } | J !
- # # B 1 ; 0 9 P p / K k 6 T R G / > B% U f g !
- # # > J \$ W p / > B% U | d f u ~ G u 3 v w # g !
- # # > J \$ W 5 1 ? 1 5) 1 p / > B% U | x f u ~ G u 3 v w # g !
- # # F 5 \$ Q % 1 ; 9 p I Y n K k 6 T R G / > B% U G I g !