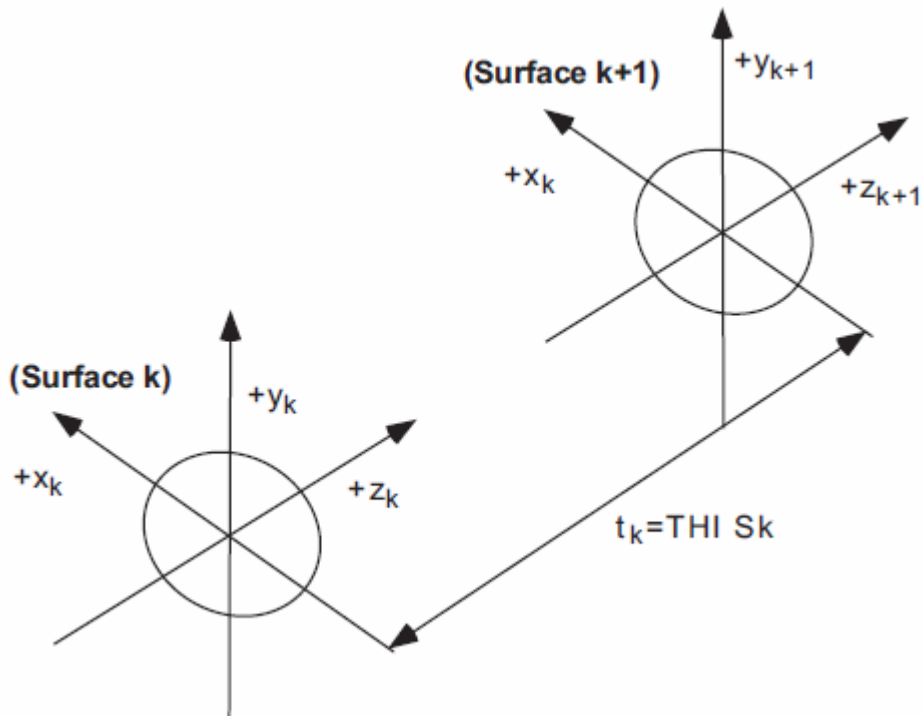


CODE V常用AUT优化命令

CODE V坐标系统定义

如图所示



AUT命令的语法格式及意义

命令格式举例

EFX [Si..j] [Wk] [Zn] >|=|< x_efl_tar

这里EFX是命令名称；x_efl_tar是约束目标值；>|=|<表示其约束关系，可以是下面的任意形式：

EFX [Si..j] [Wk] [Zn] = x_efl_tar

EFX [Si..j] [Wk] [Zn] > lower_x_efl_tar

EFX [Si..j] [Wk] [Zn] < upper_x_efl_tar

EFX [Si..j] [Wk] [Zn] > lower_x_efl_tar < upper_x_efl_tar

EFX [Si..j] [Wk] [Zn] < upper_x_efl_tar > lower_x_efl_tar

下列是命令中其他限定符的意义及默认值。[Sk]表示该命令可省略，需要使用该命令时去掉中括号[]。

限定符	意义	默认值
[Zn]	第n个变焦位置	Z1
[Sk]	第k个面	S1 (像面)
[Si..j]	从第i个面到第j个面之间的所有面	S1..I-1 (第1个面到像面前的一个面)

[Fk]	第k个视场	FL (Last field)
[Wm]	第m个波长	参考波长
[Rn]	第n个参考光线	R1 (主光线)

常用 AUT 优化命令

光学定义

EFL [Zn] >|=|< efl_tar

Effective focal length of total system (Y-Z plane)

整个系统的有效焦距 (YZ 平面)

这里 YZ 平面即子午面。XZ 平面为与其正交的平面。

EFX [Si..j] [Wk] [Zn] >|=|< x_efl_tar

EFL of surface group - X-Z plane

面组的EFL (XZ平面)

EFY [Si..j] [Wk] [Zn] >|=|< y_efl_tar

EFL of surface group - Y-Z plane

面组的 EFL (YZ 平面)

RED [Wk] [Zn] >|=|< reduction_ratio_tar

Reduction ratio - Do not use with RED solve

倍率

RED为系统放大倍率的负值。

TT [Zn] >|=|< tot_track_tar - Total track

object to image (finite conjugate only)

物像距离 (仅有限共轭)

IMD [Zn] >|=|< image_dist_tar

Image distance plus defocus

像距与离焦距离之和

IMC [Zn] >|=|< image_clearance_tar

Image surface clearance (edge or center)

注意与IMD的区别

ENP [Fk] [Zn] >|=|< entr_pup_dist_tar

Distance from S1 to entrance pupil.

从S1到入瞳的距离

EXP [Fk] [Zn] >|=|< exit_pup_dist_tar

Distance from SI-1 to exit pupil.

从SI-1到出瞳的距离

DIX [Fk] [Zn] >|=|< x_distortion_fraction_tar

Distortion fraction - X coordinate (Ex: 0.05 is 5%)

X方向上畸变因子 (如: 0.05表示5%的畸变)

DIY [Fk] [Zn] >|=|< y_distortion_fraction_tar

Distortion fraction - Y coordinate (Ex: 0.05 is 5%)

Y方向上畸变因子

生产和包装

CT Sk [Zn] >|=|< center_thickness_tar

CT (Cancels MXT,MNT,MNA,MNE,MAE on Sk for all Zn)

中心厚度

ET Sk [Zn] >|=|< edge_thickness_tar

ET (Cancels MXT,MNT,MNA,MNE,MAE on Sk for all Zn)

边缘厚度

OAL [Si..j] [Zn] >|=|< overall_length_tar

Overall length from Si to Sj

从Si到Sj的总体长度

SD Sk [Zn] >|=|< semi_diam_tar

Maximum semi-diameter of Sk needed by reference rays (near stops/images, use ray controls instead)

Sk面的最大半直径

BLO Sk [Zn] >|=|< blocking_ratio_tar

Blocking ratio (semi-diameter/radius) of Sk; + targets only

Sk 面的阻塞率 (半直径/半径)

近轴光线追迹数据

UMX [Sk] [Wm] [Zn] >|=|< x_mar_angle_tar

X-Z paraxial marginal ray exit angle

XZ面近轴边缘光线出射角

UMY [Sk] [Wm] [Zn] >|=|< y_mar_angle_tar

Y-Z paraxial marginal ray exit angle

YZ面近轴边缘光线出射角

例如: UMY S7 = 0

这个命令迫使光线在第7个光学面之后准直。

HMX [Sk] [Wm] [Zn] >|=|< x_mar_ht_tar

X-Z paraxial marginal ray height

XZ面近轴边缘光线高度

HMY [Sk] [Wm] [Zn] >|=|< y_mar_ht_tar

Y-Z paraxial marginal ray height

YZ面近轴边缘光线高度

IMX [Sk] [Wm] [Zn] >|=|< x_mar_incidence_tar

X-Z paraxial marginal ray incidence angle (index*i)

XZ面近轴边缘光线入射角

IMY [Sk] [Wm] [Zn] >|=|< y_mar_incidence_tar

Y-Z paraxial marginal ray incidence angle (index*i)

YZ面近轴边缘光线入射角

UCX [Sk] [Wm] [Zn] >|=|< x_chief_angle_tar

X-Z paraxial chief ray exit angle

XZ面近轴主光线出射角

UCY [Sk] [Wm] [Zn] >|=|< y_chief_angle_tar

Y-Z paraxial chief ray exit angle

YZ面近轴主光线出射角

HCX [Sk] [Wm] [Zn] >|=|< x_chief_ht_tar

X-Z paraxial chief ray height

XZ面近轴主光线高度

HCY [Sk] [Wm] [Zn] >|=|< y_chief_ht_tar

Y-Z paraxial chief ray height

YZ面近轴主光线高度

ICX [Sk] [Wm] [Zn] >|=|< x_chief_incidence_tar

X-Z paraxial chief ray incidence angle (index*i)

XZ面近轴主光线入射角

ICY [Sk] [Wm] [Zn] >|=|< y_chief_incidence_tar

Y-Z paraxial chief ray incidence angle (index*i)

YZ面近轴主光线入射角

1/3 阶像差

注意：如果使用Sk，则约束该面上的贡献值；如果使用Si..j，则约束这些面的总和；如果忽略Sk|Si..j，则约束所有面的总和。

AX [Sk|Si..j] [Wj..m] [Zn] >|=|< axial_color_tar

Axial color - Wj and Wm (def: W1 and Wlast)

轴向色差

LAT [Sk|Si..j] [Wj..m] [Zn] >|=|< lateral_color_tar

Lateral color - Wj and Wm (def: W1 and Wlast)

横向色差

SA [Sk|Si..j] [Wm] [Zn] >|=|< sph_aber_tar

3rd order spherical aberration

3阶球差

TCO [Sk|Si..j] [Wm] [Zn] >|=|< tan_coma_tar

3rd order tangential coma

3阶切向慧差（子午慧差）

SAS [Sk|Si..j] [Wm] [Zn] >|=|< sag_ast_tar

3rd order sagittal astigmatic blur

3阶弧矢像散模糊

TAS [Sk|Si..j] [Wm] [Zn] >|=|< tan_ast_tar

3rd order tangential astigmatic blur

3阶切向像散模糊

PTB [Sk|Si..j] [Wm] [Zn] >|=|< petz_blur_tar

3rd order Petzval blur

3阶Petzval模糊

DST [Sk|Si..j] [Wm] [Zn] >|=|< distortion_tar

3rd order distortion

3阶畸变

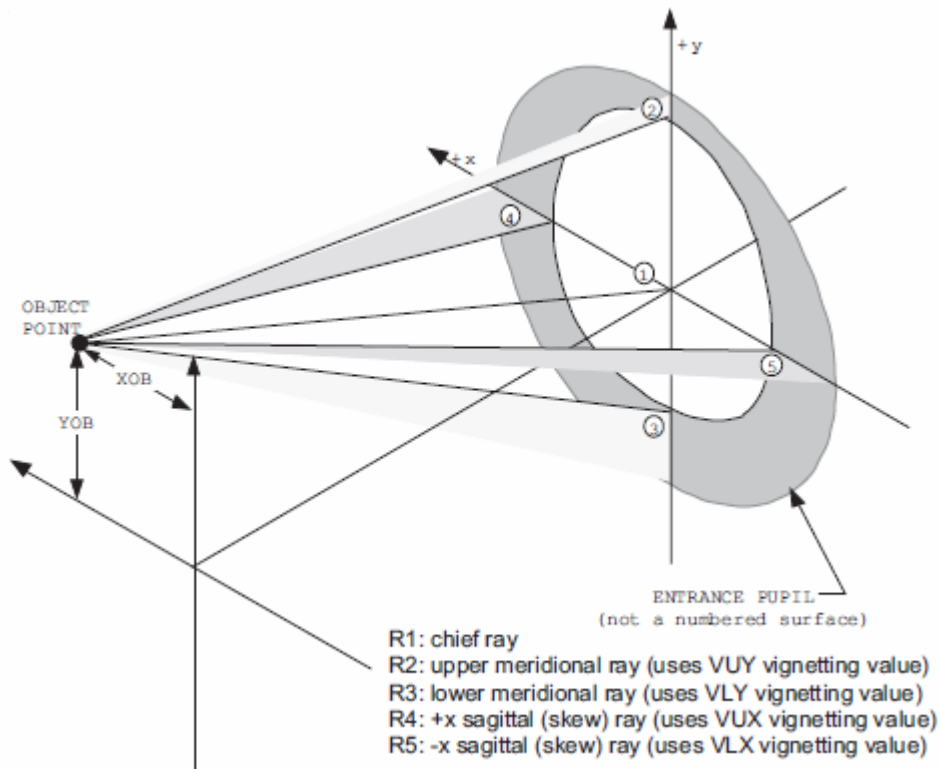
PTZ [Sk|Si..j] [Wm] [Zn] >|=|< petz_curv_tar

Petzval surface curvature

Petzval 表面曲率

真实光线追迹数据

参考光线定义如图所示



RAY Ri Fk|Fi..j [Zk|Zi..j] x_pupil_fract y_pupil_fract

Define ray Ri (must be R6,R7,R8, or R9) for specified fields/zooms; x, y are pupil coordinates (fractions of radius)

定义参考光线

例如: RAY R6 F3 0.5 0.5

这里XY光瞳坐标最大值归一化为1。

最多可再定义4条参考光线，也就是必须为R6、R7、R8、R9。需要单独为每一个视场定义参考光线。

X [Ri] [Sk] [Wm] [Gj] [Fk] [Zn] >|=|< x_coord_tar

X surface coordinate - ray Ri, Fk, Zn, for Wm

X面坐标

Y [Ri] [Sk] [Wm] [Gj] [Fk] [Zn] >|=|< y_coord_tar

Y surface coordinate - ray Ri, Fk, Zn, for Wm

Y面坐标

Z [Ri] [Sk] [Wm] [Gj] [Fk] [Zn] >|=|< z_coord_tar

Z surface coordinate - ray Ri, Fk, Zn, for Wm

Z面坐标

L [Ri] [Sk] [Wm] [Gj] [Fk] [Zn] >|=|< l_opt_dir_cos_tar

L optical direction cosine following Sk - ray Ri,Fk,Zn, for Wm

Sk面后的L光学方向余弦

M [Ri] [Sk] [Wm] [Gj] [Fk] [Zn] >|=|< m_opt_dir_cos_tar

M optical direction cosine following Sk - ray Ri,Fk,Zn, for Wm

Sk面后的M光学方向余弦

N [Ri] [Sk] [Wm] [Gj] [Fk] [Zn] >|=|< n_opt_dir_cos_tar

N optical direction cosine following Sk - ray Ri,Fk,Zn, for Wm

Sk面后的N光学方向余弦

OP [Ri] [Si..j] [Wm] [Fk] [Zn] >|=|< optical_path_tar

Optical path between Si and Sj - ray Ri, Fk, Zn, for Wm

Si和Sj面之间的光程

OPD [Ri] [Wm] [Fk] [Zn] >|=|< opd_tar

Optical path difference - ray Ri, Fk, Zn, for Wm

光程差

一般约束

MXT max_ele_center_thi

Largest CT on elements (Def: 1/2 max diam)

最大零件中心厚度

MNT min_ele_center_thi

Smallest CT on elements (Def: 1/10 min diam)

最小零件中心厚度

MNE min_ele_edge_thi

Smallest ET on elements (Def: = MNT)

最小零件边缘厚度

MNA min_air_center_thi

Smallest CT, air spaces (Def: 0.005,0.01,0.1)

最小中心空气间隔

MAE min_air_edge_thi

Smallest ET, air spaces (Def: 0.0001,0.00025,0.0025)

最小边缘空气间隔

MXA [Sk|Si..j] Yes|No|max_angle_inc_degr

Maximum angle of incidence of reference rays (Def: No)

(default for Yes is 60°, default surface range is S1..I-1)

参考光线最大入射角

GLA [Sk|Si..j] map_corner1 map_corner2 map_corner3...5

Glass map convex polygon defined in Nd, NF - NC space by straight lines joining 3 to 5 corner points(Def: GLA SA NFK5 NSK16 NLAf2 SF4)

定义玻璃范围

优化控制

GS [Yes|No|discrimination_factor]

Enable Global Synthesis. Discrimination factor distinguishes between distinct and equivalent solutions (default: 1.0)(Def: No)

全局优化。默认关闭。

INT Yes|No

Interactive - interrupt at each cycle (Def: No)

每个循环都进行交互或中断

MXC num_of_cycles_max

Maximum number of permitted cycles (Def: 25)

允许的最大循环次数（默认值：25）

MNC num_of_cycles_min

Minimum number of required cycles (Def: 2)

允许的最小循环次数（默认值：2）

TIM max_cpu_minutes

CPU time limit (minutes) (Def: No time limit)

CPU运行时间限制（分钟）（默认值：无时间限制）

TAR lower_lim_err_fun [upper_lim_err_fun]

Exit when err_fun below lower limit. Global Synthesis will not save lenses if err_fun above upper limit(Def: 0.0 1.0E15)

误差函数目标值

当误差函数值低于最小限制时，退出优化循环。如果误差函数值高于最大限制，全局优化不保存镜头（默认值：0.0 1.0E15）。

IMP min_impr_factor

Continue unless improvement percentage remains below this level for several cycles. For example, the default value of 0.05 indicates a 5% decrease in the error function value.

(Def: 0.05)

最小改善因子

优化循环中，改善因子大于该值时，优化继续，否则优化停止，退出循环。