

命令模式

MAXVCG D-Spec [/T-Spec] [/Composite [:UN GAP]] [/LOokup] [/EXTERNAL: filename] [/GMRA] [/GM:WPL| SLOPE| LESSER| RA| BLEND| MODU] [/FIXDIR] [/BOTHDIR] [/FIRSTMAX] [/AXIS: MINRA] [/TOL:dvcg] [/RAMACRO[:name]] [/ID:"source"]

Computes and displays curves of maximum VCG required to meet the current stability criterion as a function of displacement and trim.

按照排水量和纵倾的函数关系，计算并显示满足当前稳性横准的最大 VCG 曲线。

MAXVCG Title title

Changes the title assigned to the current max VCG data for plot headers and Load Editor.

改变当前最大 VCG 的标题，使其在表头及装载编辑器显示。

MAXVCG [/NOTOL] [/HMAX:h] [/FSM | /TRUEFSM | /EXTRAFSM] [/NOFSA] [/PRINT]

If maximum VCG data is available from a previous execution, this form may be used to get a quick display of the maximum VCG at the current condition.

如果从之前的计算中已经得到最大 VCG，这种方式可以快速的显示当前工况下的最大 VCG。

MAXVCG VALID

Makes the maximum VCG data accessible again after it has been invalidated.

使无效的最大 VCG 再次可用。

MAXVCG OFF

Discards any saved maximum VCG data.

放弃保存的任何最大 VCG 数据。

Note: When computing maximum VCG, the current damage, wave and heeling /trimming moment conditions are used.

说明：当计算最大 VCG 时，会使用当前的破舱，波浪和横倾/纵倾力矩数据。

D-Spec may take one of the following forms:

可以采用下面某种方式定义吃水：

[DRaft [@ location] =] d1, ..., dn

or

Displ = w1, ..., wn

DRAFT @ location =

The longitudinal location at which the drafts are taken. If omitted, the locations of the LCF are assumed.

读取纵向位置的吃水。如果省略，默认使用漂心位置的吃水。

d1, ..., dn

A list of (intact) drafts from which displacements are determined for use as abscissae on the maximum VCG curves.

船舶无破损情况下，一系列有排水量决定的吃水，在最大 VCG 曲线中作为横坐标。

w1, ..., wn

A list of displacement weights to be used as abscissae on the maximum VCG curves.

一系列排水量，在最大 VCG 曲线中作为横坐标。

T-Spec may take one of the following forms:

纵倾可以采用下列方式来定义：

TRIM: t1, ..., tn

or

LCG: l1, ..., ln

where t_i are trim angles and l_i are LCG values. $i \leq 10$. The trim angles maybe given directly in degrees or as a ratio of trim distance over length (see the TRIM command). Trim angles refer to the intact, zero-heel condition.

t_i 为纵倾角度 l_i 为纵向重心位置, $i \leq 10$. 纵倾角度可以直接给定角度或用纵倾距离和船长的比值来表示（查看命令 TRIM）。纵倾角度是船舶完整且横倾为 0 条件下角度。

If /T-Spec is omitted, the current trim is assumed.

如果省略参数/T-Spec，默认使用当前的纵倾角。

/COMPOSITE [:UN GAP]

Compiles a composite set of maximum VCG data combined with previous MAXVCG runs, reflecting the lowest VCGs encountered. All MAXVCG runs must be compiled with identical draft/displacement and trim/LCG lists; the trim form is only allowed if zero. If the UN GAP subparameter is present then gaps in either the previous or new MAXVCG curve may be filled in by data from the other curve, otherwise such gaps are preserved.

汇总之前命令 MAXVCG 计算的结果数据，形成综合的一系列最大 VCG 数据。所有的 MAXVCG 计算必须要基于相同的吃水/排水量和纵倾/LCG 列表；此时，只允许纵倾为 0。如果附加参数 UN GAP，那么之前或新的 MAXVCG 曲线间的偏差可以有其它的曲线来填补，否则此偏差被保留。

/LOOKUP

Specifies "lookup mode" where it looks up, rather than calculates, maximum VCG values in the table already calculated by the previous MAXVCG command (or composite of previous MAXVCG commands).

设定"查找模式"，不必计算而是查找经之前命令已经计算完成的或汇总的最大 VCG 数据。

/EXTERNAL: filename

Causes the maximum VCG data to be taken from the named file; alternatively, this file may contain minimum GM data which is automatically translated into maximum VCG data.

从指定的文件中读取最大 VCG 数据。若文件含有最小 GM 数据，也可以将其转化为最大 VCG 数据。

/GMRA

Causes GM to be calculated from righting arms rather than from the waterplane (see the RA command for more information).

从回复力臂中计算 GM 值，而不是从水准面计算 GM 值。（查看命令 RA 了解更多信息）。

/GM:WPL|SLOPE|LESSER|RA|BLEND|MODU

Provides additional GM calculation options (see the RA command for more information).

提供另外的 GM 计算方法（查看命令 RA 了解更多信息）。

/FIXDIR

Requests that the heeling direction as specified in the ANGLES list be used rather than automatically selecting the direction to heel.

计算时使用 ANGLES 命令中设定的横倾方向（左舷或右舷）而不是自动选择横倾方向。

/BOTHDIR

Causes both port and starboard heel to be checked with the lower VCG being reported.

左倾和右倾两个方向都要计算求得最小的 VCG。

/FIRSTMAX

Makes MAX in the LIMIT command refer to the angle at the first-encountered maximum RA.

命令 LIMIT 中的 MAX 为回复力臂最大时的角度。

/AXIS:MINRA

Finds a new axis where max RA is minimized at the maximum VCG for each displacement.

找到每一排水量下，VCG 最大条件下，最大 RA 值相对于其它轴的最大 RA 值最小的轴。

/TOL:dvcg

Specifies a tolerance in the reported maximum VCG values. The reported values are allowed to vary from the actual maximum VCG by up to the given dvcg value, plus or minus. Small tolerances may increase the run time substantially.

指定最大 VCG 数值偏差，报告的数值允许在实际的最大 VCG 基础上加减此偏差范围。小的偏差范围会延长计算时间。

/RAMACRO [:name]

Causes execution of the named macro ("RAMACRO" by default) to obtain effective heel righting arm values. This macro is responsible for defining the output real variable RAH_RA to equal the righting arm in current length units based on the current heel (see RA example).

运行指定的宏（默认"RAMACRO"）获得横倾力臂值。这个宏命令可用来定义输出变量 RAH_RA 来平衡当前横倾下的回复力臂（查看命令 RA）。

/ID:"source"

Identifies the current source when making a composite set of maximum VCG data, so future MAXVCG /LOOKUP reports can display the source responsible for each Max VCG result.

当生成综合的最大 VCG 曲线时，标明 VCG 数据的来源，所以 MAXVCG/LOOKUP 生成的报告会显示每一个最大 VCG 结果的来源。

title

A stability criterion description or other title up to 35 characters long.

稳性横准或其它标题，最多可达 35 个字符。

Any LIMIT TITLE takes precedence in plot headers, but not in Load Editor.

显示在图表表头的横准标题，但在装载编辑器中不显示。

/NOTOL

Specifies that no extrapolation be allowed for maximum VCG data.

不允许对最大 VCG 进行推算（外部插值）。

/HMAX: h

Specifies the maximum allowed heel angle with unfrozen tank loads present (default is 5°).

设定当前非冻结舱室装载时船舶的最大允许的横倾角度。（默认为 5 度）。

/FSM | /TRUEFSM | /EXTRAFSM

Temporarily increases the center of gravity by applying the specified Free Surface Moment (see the RA command where these parameters perform a similar function).

通过设定自由液面力矩暂时增加重心高度（查看命令 RA，这些参数有相似的作用）。

/NOFSA

Displays Free Surface Adjustment as "n/a" and ignores it when computing VCG Margin.

显示自由液面的修正为“n/a”（不适用），当计算 VCG 余量时忽略该修正。

/PRINT

Prints the report to the current output device instead of to the screen.

通过打印设备打印报告而不是屏幕显示该报告。

Operation

操作

One curve of maximum VCG vs. displacement is produced for each number in the trim specification. (If no trim specification is given, the trim used is that in effect when the MAXVCG command is issued.)

生成不同纵倾下不同排水量下的最大 VCG 曲线。（如果没有给定明确的纵倾，那么采用命令 MAXVCG 运行时纵倾）。

The fixed-weight VCG value in effect when the MAXVCG command is executed is considered to be the "floor" or minimum value below which the VCG is not permitted to go.

当命令 MAXVCG 运行时，固定重量的 VCG 被认为是最小的 VCG，低于此值的 VCG 不允许运行。

A stability criterion must have been established prior to issuing the MAXVCG command (see the LIMIT command).

在运行命令 MAXVCG 前，就必须要把稳性横准定义完毕。（查看命令 LIMIT）。

If trim is specified, it is applied at zero heel. If the trim is not fixed, the trim is used to find the LCG at each particular displacement, and that LCG (together with the trial VCG) is used to determine the variation of trim with heel. If the trim is initially fixed, it remains fixed for all heel angles.

如果定义了纵倾，横倾为 0 时使用此纵倾。如果没有锁定纵倾，会变化纵倾找到每一排水量下的纵向重心位置 LCG，会使用 LCG（和假定的 VCG）来决定纵倾随横倾的变化。如果初始就锁定纵倾，那么纵倾在所有横倾角下都保持不变。

If LCG is specified, only the specified values are used. In this mode, the trim is allowed to vary even if it was "fixed".

如果设定了 LCG，只使用设定的 LCG，在这个模式中，纵倾允许变化即使纵倾被锁定。

The LCG parameter forces variable trim, even if FIX TRIM is in effect.

参数 LCG 使得纵倾发生变化，即使纵倾被锁定。

Any tank loads are ignored.

忽略任何的舱室装载。

The TCG is assumed to be zero.

横向重心位置 TCG 假定为 0

In the first form of the command, drafts (at zero heel and at the specified trim) determine the displacements to be used. If the "DRAFT @ location" is omitted, LCF drafts are assumed.

定义吃水的第一种形式中，使用吃水（横倾为 0，设定纵倾）决定的排水量。如果省略"DRAFT @ location"，默认使用漂心位置的吃水。

In the second form of the command, the given displacements are used directly.

定义吃水的第二种形式中，直接使用给定的排水量。

The draft/displacement lists should be given in order, either ascending or descending.

吃水/排水量应该按照一定的顺序给定，逐步增大或逐步减小。

If Critical Points with FLOOD status are in effect, they are assumed to be downflooding points for use in any criterion limits which involve the angle of downflooding.

当到达稳性横准中定义的进水角度时，定义的 FLOOD 类型的关键点就会被认为是进水点。

In the presence of damage, the intact zero-heel equilibrium is first determined, applying the specified displacement and trim. The direction of heel is then determined (in the absence of the /FIXDIR or /BOTHDIR parameters) by checking the righting arm after damage. If there is an initial tendency to heel to one side or the other, the favored side is used.

在破损时，首先找到完整无横倾时的平衡点，赋予指定的排水量和纵倾。通过检查破损后的回复力臂决定横倾的方向（当没有参数/FIXDIR 或 /BOTHDIR 时）。如果初始有向某侧倾斜的趋势，那么采用初始倾斜的方向。

Care should be taken that all off-center downflooding points have been placed correctly on the port and/or starboard sides when the direction of heel is uncertain.

应该注意不确定横倾方向时，不在中心线上的进水点，要确保正确的设定在左舷或右舷。

If the /FIXDIR parameter is given, the direction of heel is dictated by the list of heel angles established through the ANGLES command (initially this direction is to starboard). If the /BOTHDIR command is present, both directions of heel are tried and the one yielding the lower VCG is used for reporting the maximum VCG and limit margin results.

如果设定参数/FIXDIR,横倾方向为命令 ANGLES 定义的横倾角度方向(此方向一般为向右倾斜)。如果设定参数/BOTHDIR,左右横倾方向都要被考虑，以求的最大的 VCG 和余量是以较小的 VCG 为准。

The process of finding the maximum VCG involves a trial-and-error loop where the results of applying the stability criterion are used to predict a new trial VCG. The process continues until the margin for all of the limits in the criterion are positive or zero, and at least one is zero to within 0.5% of the criterion value (0.5° for limits in terms of angle). There are cases, however, where a "double-humped" righting arm curve makes it impossible to find a VCG which yields a zero margin on a limit involving the angle at the maximum righting arm.

求解最大 VCG 是反复循环计算的过程，一般从假定的 VCG 开始计算，计算过程持续到横准余量为 0 或正值，且至少余量为 0 到 0.5%之间，（0.5°为限定的角度）。当复原力臂曲线为“双驼峰”的形状时，在复原力臂最大值时，不可能求的余量为 0 的 VCG。

Caution: This command may involve the running of four to twenty or more trial stability curves at each individual displacement and initial trim.

注意：在每一个排水量和初始纵倾下，这个命令可以计算 4 到 20 或更多的稳性曲线。

Depending on the complexity and characteristics of the vessel, the stability criterion and the speed of the computer, it may require several minutes for each point on the maximum VCG curves.

因为船舶规格参数的复杂性，稳性横准选取不同和电脑运行速度等因素，最大 VCG 曲线上的每一个点都可能需要几分钟时间去计算。

Quick Stability Evaluations

快速评估稳性

The MAXVCG command stores the maximum VCGs for later reference. When the MAXVCG command is given without primary parameters (draft/displacement list) and maximum VCGs are present from an earlier MAXVCG command, then an interpolation is made using the stored values. The result of the interpolation is shown on the screen or output device and compared with the current VCG.

命令 MAXVCG 储存最大的 VCG 值以备后用，当只运行命令 MAXVCG 而不附加任何的参数（吃水或排水量），会出现之前命令 MAXVCG 求解的最大 VCG，利用之前命令 MAXVCG 求解的最大 VCG 进行插值求解。插值求解的结果会被屏幕显示或输出到打印设备并与当前的 VCG 值进行比较。

The stored values are invalidated if any of the following are changed: the stability criterion, the damage configuration, the heeling/trimming moment, the wave condition or the specific gravity of the water when heeling/trimming moments are in effect. Since the stored values are not actually discarded, they may be made accessible again by means of the MAXVCG VALID command. But this should not be done except after the original condition has been restored or while obtaining composite maximum VCG data (which /COMPOSITE parameters implicitly validate). Indiscriminate use of MAXVCG VALID may result in false stability information.

如果下面的内容改变将导致储存的数值无效：稳性横准，破损组合，横倾/纵倾力矩，波浪参数或当横倾/纵倾力矩有效时的水的密度。储存的数值没有被丢弃，可以使用命令 MAXVCG VALID 使其再次可用。除了已经储存初始工况或得到复合的最大 VCG 数据（参数/COMPOSITE 是有效的），其它条件下不要使用此命令。随便使用 MAXVCG VALID 可能会导致错误的稳性结果。

If a free surface moment exists, the corresponding VCG adjustment is also shown. The formal free surface moment is used unless the /TRUEFSM parameter causes the true FSM to be used.

如果存在自由液面力矩，会显示相应的 VCG 修正。一般使用形式的自由液面力矩，如果附加参数/TRUEFSM，会使用实际的自由液面力矩。

The stored maximum VCG data are also available when setting VCG MAX. See the VCG command for details.

当设定 VCG MAX 时储存的最大 VCG 数据是可用的。查看命令 VCG 了解详细信息。

When using the Quick Stability Evaluation method, it is recommended that at least six drafts or displacements and at least three trims or LCGs be specified (covering the expected range of the vessel's operating conditions) on the initial MAXVCG

command. Enough data must be produced so that interpolation does not result in significant errors between the data points.

当使用稳性快速评估方法时，在初始 MAXVCG 命令中，建议至少设定 6 个吃水或排水量和至少 3 个纵倾或纵向重心位置 LCG（包含船舶的所有预期的操作工况）。要生成足够多的数据，这样在数据点间插值时才不会导致大的错误。

It is recommended that a righting arm curve always be run to check the result.

建议要算出回复力臂曲线来校核结果。

The SAVE command records the maximum VCG data so that it is restored when the SAVE file is later RUN. Several criteria may be applied and the results saved on different files.

在运行 SAVE 文件时，命令 SAVE 会记录最大 VCG 数据，会存储最大 VCG 数据。基于不同横准计算的数据会被储存在不同的文件上。

Composite Stability Criteria

综合稳性横准

It is possible to compile a composite set of maximum VCG data that reflects the lowest VCGs encountered during two or more MAXVCG runs. For example, the results of an intact criterion may be combined with a damaged criterion applied to several different damage configurations.

可以通过两次或更多次运行 MAXVCG 求解一系列的最大 VCG 数据，来求得最小的最大 VCG。例如：可以在破舱横准下计算几组不同的破损舱室组合来求解稳性结果。

To create a composite curve, enter two or more MAXVCG commands with identical lists for draft/displacement and trim/LCG, using the /COMPOSITE parameter on all but the first. Specifying nonzero trim is not compatible with creating composite curves, instead a range of LCGs should be used.

为生成综合的最大 VCG 曲线，要在同一吃水/排水量和纵倾/LCG 的不同工况利用命令 MAXVCG 求解最大 VCG，并附加参数/COMPOSITE。生成综合的最大 VCG 曲线时，不要设定纵倾，要设定一定范围的 LCG。

The final composite curve can be displayed (in terms of either trim or LCG) using the /LOOKUP parameter to produce a table and plot of the composite data. The drafts (or displacements) and trims (or LCGs) to be looked up need to fall within the range of those previously calculated so the maximum VCG can be found by interpolation. If /LOOKUP and /COMPOSITE are used in the same command, /COMPOSITE is ignored except that it forces /LOOKUP to trap an error if the draft/displacement and trim/LCG parameters are not identical to those in the foregoing MAXVCG commands. For example,

可以从纵倾或 LCG 来显示最终综合的最大 VCG 曲线，附加参数/LOOKUP 可以生成最大 VCG 数据的表格和图表。求解工况的吃水（或排水量）和纵倾（或 LCG）必须位于之前求解最大 VCG 工况的范围之内（译者注：只允许内部插值而不允许外部插值），才能够经过插值求得最大 VCG。如果在同一命令中同时附加参数/LOOKUP 和/COMPOSITE，会忽略参数/COMPOSITE 的作用，

除非之前计算 MAXVCG 时的吃水/排水量和纵倾/LCG 不一致, 而使用 /LOOKUP 去查找错误。例子如下:

```
MACRO MV
MAXVCG DISPL: 400 450 ... 700 /LCG: 50 55 60 65 /ID:"%1" %2
/
.INTCRIT
.MV "Intact Energy"
.DAMCRIT
.ZONE1 FLOOD
.MV "Flooded Zone 1" /COMPOSITE
.ZONE1 INTACT
.ZONE2 FLOOD
.MV "Flooded Zone 2" /COMPOSITE
.ZONE2 INTACT
MAXVCG TITLE "Damage and Intact"
SAVE
MAXVCG DISPL: 400 450 ... 700 /TRIM: -1, 0, 1 /LOOKUP
```

combines the lowest VCGs from three different MAXVCG runs, each identified with its source, then the composite curve is interpolated for each trim.

汇总组合 MAXVCG 命令求解的 3 种不同工况的 VCG, 每个 VCG 都会被标明出处, 然后利用求解的 VCG 差值求得设定纵倾下的 VCG.

Note that INTCRIT and DAMCRIT would be macros that activate different stability criteria, while ZONE1 and ZONE2 would be macros that set groups of tanks to damaged or intact conditions.

宏 INTCRIT 和 DAMCRIT 表示运行定义的稳性横准, 宏 ZONE1 和 ZONE2 表示设定定义的舱室组合的类型为完整舱室或破损舱室。

External Mode

外部模式 (调用外部 MAXVCG 数据)

When the /EXTERNAL parameter appears, the file which it names is expected to contain a list of maximum VCG or minimum GM values. The values are read from the file instead of being computed. If the values on the file are minimum GMs the corresponding maximum VCGs are derived automatically.

当使用参数 /EXTERNAL 时, 被引用的此外部文件应该包含一系列的最大 VCG 或最小 GM 值, 此文件的数据直接被读取引用, 如果文件上的数据为最小 GM 值, 那么会自动提取相应的最大 VCG 值。

The number and order of the values on the file must correspond exactly to the number and order of the maximum VCG values which would be produced without the /EXTERNAL parameter.

外部文件包含的数据个数和次序必须要和无参数/EXTERNAL 时生成的数据个数和次序相对应。

The values on the file must be listed one per line and be in the current length units. UNDEF can be used for an undefined value; FILL linearly interpolates from the nearest numeric values specified on preceding and following lines.

外部文件的数据应该每行一个数据，单位为当前长度单位，UNDEF 表示未定义的数据；在最接近的上面和下面两行数据间进行线性插值求解。

In addition, the file must contain one header line and one line prior for each series of data representing a value of trim or LCG. The format is as follows:

另外，文件必须含有顶部标题行和标明纵倾或 LCG 位置的状态行，状态行位于数据行的上面。格式如下：

Header Line

Series 1 Line

data lines

Series 2 Line

data lines

...

The header line must be literally one of the following:

顶部标题行必须按照下面格式说明：

***MAXVCGDATA or**

***MINGMDATA**

The Series lines must have one of the following forms:

状态行必须按照下面的某种格式说明：

TRIM=t or

LCG=l

where t is the corresponding trim angle in degrees (negative if fwd) and l is the corresponding LCG value.

t 表示相应的纵倾角度，单位用度表示，艏倾为负。l 表示相应的 LCG 数值。

Each data line is composed of a maximum VCG or minimum GM value, followed by optional source identification text (if not present, any /ID:"source" value is used).

每行数据行为最大 VCG 或最小 GM 值，后面为数据的出处说明。（如果不出现出处说明，要使用参数/ID: " source " ）。

Display Output

显示输出

A table is produced with a row for each displacement and columns showing the final VCG and the final margin for the first 9 limits in the stability criterion. A separate table is shown for each trim or LCG in the Trim Specification.

生成表格来显示每一排水量下对应的最大 VCG 及相对于横准的余量。设定的不同的纵倾或 LCG 分别用相对应的表格来表示。

Finally, the stability criterion is shown.

最后显示所应用的稳性横准内容。

If in EXTERNAL mode, the table shows the maximum VCG values but no margin values or stability criterion.

如果采用 EXTERNAL 模式，表格显示最大 VCG 但不显示余量或稳性横准。

Since the presence of a ROLL angle definition causes the MAXVCG process to behave differently than it normally would, the MAXVCG table header includes the words "with ROLL" when the roll angle is present.

如果定义了 ROLL 角度，那么 MAXVCG 的计算过程会和正常过程有所不同，结果表格显示最大 VCG 时，在数据的表头会出现 " with ROLL " 的说明。

MAXVCG /PRINT displays the maximum VCG at the current condition on the output device; i.e. the disk or the printer.

MAXVCG/PRINT 会储存当前工况下的最大 VCG 到输出设备，即:硬盘或打印机。

Nondisplay Output

无显示输出

A single table is produced with a column for each separate initial trim/LCG. Only the VCGs are shown (the limit margins are not included).

表格只显示纵倾/LCG 对应的 VCG，不显示横准余量。

Examples

样例

Computing maximum VCGs at given initial drafts, zero trim only:

纵倾为 0，计算给定吃水下的最大 VCG.

LIMIT AREA FROM 0 TO 30 = 10.34

.

.

.

ANGLES 0, 5, ..., 40

VCG = 10

TRIM = 0

MAXVCG 10, 12, ..., 18

Computing maximum VCG curves at 3 initial trims; initial drafts at LCFs:

计算给定纵倾和吃水下的最大 VCG, 吃水为漂心位置的吃水。

LWL = 160

MAXVCG DRAFT = 9, 10, 11, 12 /TRIM: 1f/0,1a/

Computing a maximum VCG curve at specified displacements:

计算给定排水量下的 VCG。

MAXVCG DISPL = 1000, 1050, ..., 3000

Taking maximum VCG data from an external source:

从外部文件读取最大 VCG 数据。

MAXVCG DRAFT = 9, 10, 11, 12 /TRIM: 1f, 0, 1a /EXTERNAL: MVCG.DAT

The file MVCG.DAT contains:

文件 MVCG.DAT 包含如下内容:

***MAXVCGDATA**

TRIM=-1

40.50

39.58

38.70 Damage Case 1

37.75

TRIM=0

...

Displaying the maximum VCG in the current condition:

显示当前工况下的最大 VCG。

MAXVCG