命令模式

GROUND "description", b, lcb, tcb, vcb [/PENetration:dd0[,ddm]] [/LINEAR]
[/NOTE:"note"] [/NOWARN]

Adds a buoyant force for modeling ground points.

增加一类似浮力的搁坐点。

GROUND [(part\component)] /FLOOR: "filename" | depth [/L] POS:x,y] [/HEADing:ang]
[/CLEARance:c] [/MAXPEN:ddm] [/NPoints:np] [/LINEAR]

Automatically issues ground points determined by the specified seafloor file or depth.

自动发出由指定的海底文件或深度确定的搁坐点。

GROUND (n), [dvar[,bvar[,lvar[,vvar]]]] [/PEN: pvar[,mvar]] /ACcess

Accesses the nth ground point's data into the named variables.

将第 n 个搁坐点的数据访问到命名变量中。

GROUND "description", [bvar[, lvar[, tvar[, vvar]]]] [/PEN:pvar[,mvar]]/ACCESS

Accesses the described ground point's data into the named variables.

给所描述的搁坐点赋予变量。

GROUND REPort

Produces a report showing distances to ground and ground reactions.

生成报告显示船底到搁坐点的距离和搁坐力大小。

Definition: Ground Reaction is a buoyant force acting at one or more points on the vessel in response to the contact between the vessel and the ground at those points.

定义：搁坐力是当一个或几个搁坐点与船体接触时，在这些点的位置对船体产生的与浮力类似的向上的反力。

参数说明

"description"

Up to 25 characters (must be enclosed in quotation marks if more than one word).

最多为 25 个字符（如果多于一个单词必须用引号引起）。

b

The present magnitude of the ground reaction at this point in current weight units (see the UNITS command). If this is to be computed according to the penetration, an asterisk may be used. The specified reaction force is ignored if it conflicts with the /PEN parameters; for example, if the given penetration is negative then the reaction must be zero.

在某搁坐点的搁坐力，单位为当前重量单位（参看命令 UNITS）。如果需要根据穿透深度计算此力，可以使用星号*代替。搁坐点的穿透深度发生矛盾时的搁坐力将被省略，比如，穿透深度为负时，则搁坐力为零。

lcb, tcb, vcb

Longitudinal, transverse, and vertical location of the ground point in current length units, relative to the origin. Normally this location would be on the surface of the hull but there is no restriction on its location. MIN or MAX can used in place of tcb to specify the minimum (portmost) or maximum (starboardmost) values at the given lcb and vcb on the surface of the vessel. Likewise MIN or MAX can be used in place of vcb for the lowest or highest displacer points at given lcb and vcb. PMIN and PMAX act like MIN and MAX but only consider components with positive effectiveness.

搁坐点相对于原点在纵向，横向和垂向的坐标位置，单位为当前长度单位。一般情况下此搁坐点位于船体表面，但是具体位置没有限制。MIN 或 MAX 可以代替 tcg，来表示在给定 LCG，VCG 处的船表面，最左舷或最右舷位置。同理，MIN 或 MAX 也可以代替 vcg，来表示排水类子模型，在给定 LCG，TCG 处最下端或最上端位置；PMIN 和 PMAX 同 MIN 和 MAX 作用相似，但它只考虑了，起积极作用的构部件。

dd0

The difference between the depth of the ground point (lcb, tcb, vcb) and the depth of the ground (i.e. the current penetration of the hull into the ground). If the ground point is above the ground, dd0 is negative. If omitted, dd0 is assumed to be such that the given b is achieved (so zero if b is *, except replacing an existing point retains the old penetration).

表示搁坐点穿透水底的深度。如果搁坐点位于地面之上，dd0 是负的。如果省略此参数，dd0 默认为给定的搁坐力 b 所需达到的深度（所以如果 b 是 *，则为零，除了替换现有点保留旧穿透深度）。

ddm

The maximum penetration. This is considered to be the penetration where the buoyant force equals the entire weight of the ship; i.e. the penetration which would occur if the entire weight of the ship (exclusive of any tank loads) were supported by the ground. If omitted, ddm is assumed to be 0.2% of the overall length of the ship unless ddo and b are both present and positive, in which case the value of ddm is set to be consistent with them.

最大穿透深度，此时搁坐点的搁坐力等于船舶的整个重量。即为船舶的整个重量（不包含任何的舱室载荷）都被搁坐点支撑，那么此时的穿透深度为最大穿透深度。默认 ddm 为船总长的 0.2%。如果省略参数 ddm，而 dd0 和 b 都出现且为正，则 ddm 的值将和它们保持一致。

/LINEAR

Generates a linear grounding force that is directly proportional to the penetration (for constant stiffness rather than the normal ground force proportional to the penetration squared).

生成和穿透深度成线性比例的搁坐力。（即为-刚度为常数，而不是常用的搁坐力与穿透深度的平方成比例）。

/NOTE: "note"

Specifies a note to show in the Load Editor footer. See the ADD command for details.

在装载编辑器的底部添加说明。详细信息参看命令 ADD。

/NOWARN

Avoids the warning message when the ground point replaces another item.

当搁坐点取代其它项目时避免出现警告信息。

part\component

The part component for which ground points should be issued. If not specified, the default is the first part named "HULL" or the first displacer. Seafloor point descriptions have the prefix "part\component-" followed by a sequential identifying number.

指定搁坐点的几何部位（舱室）。如果未指定，则缺省值为名为船体“HULL”的部位或舱室。搁坐点描述具有前缀“部件\舱室”，后跟一个连续的标识号。

/FLOOR: "filename" | depth

Specifies the filename containing seafloor data, or alternatively a constant depth relative to the water surface. The first line of the seafloor text file is an arbitrary title line. The second line starts with an optional "L" indicating longitude-latitude data, followed by required "F" for feet or "M" for meter units. Each subsequent data line defines a single point on the seafloor based on three numbers (separated by spaces or commas). The first number on each line is the horizontal (West to East) coordinate, the second is the vertical (South to North) coordinate, and the third is the associated sounding depth. Longitude and latitude data may be entered in decimal degrees or degree-minute-second format (e.g. -122d56'58.974").

指定包含海底数据的文件名，或者指定相对于水面的恒定深度。海底文本文件的第一行是任意标题行。第二行以指示经纬度数据的可选“L”开头，后跟所需的“F”表示英尺或“M”表示米单位。随后的每一条数据线根据三个数字（用空格或逗号分隔）定义海底的单个点。每条线上的第一个数字是水平（从西到东）坐标，第二个是垂直（从南到北）坐标，第三个是相关的探测深度。经度和纬度数据可以十进制度或度-分-秒格式输入（例如 -122d56'58.974“）。。

/HEADING: angle

The heading angle in degrees of the vessel's positive longitudinal axis counterclockwise from the positive vertical North seafloor axis (default=0).

船舶正纵轴从正垂直北海床轴逆时针方向逆时针的航向角（默认值 = 0）。

/[L]POS: x, y

The location of the vessel origin in the seafloor coordinate system (default=0,0). If /LPOS is used, locations are taken as degrees of longitude and latitude in either decimal degrees or degree-minute-second format.

船舶原点在海底坐标系中的位置（默认值 = 0，0）。如果使用 /LPOS，则位置将以十进制度或度-分钟-秒格式作为经度和纬度。

/CLEARANCE: c

The maximum clearance within which all issued ground points must fall. Clearance is defined as the vertical distance from the ground point to the nearest ground, or the negative of the penetration. If not specified, the default may take one of two forms: (1) if a seafloor file is indicated, the default clearance will be set to the vessel's current

origin depth; or (2) if a constant floor is specified, the default clearance will be set equal to the floor depth.

所有已定义的搁坐点必须落在的最大间隙内。间隙定义为从搁坐点到最近地面的垂直距离，或穿透的负数。如果未指定，则默认可能采用以下两种形式之一：（1）如果指示了海底文件，则默认间隙将设置为船舶当前的原点深度; 或（2）如果指定了恒定高度，则默认间隙将设置为等于恒定深度。

/MAXPEN: ddm

The maximum penetration of any issued ground point (see /PEN's ddm parameter).

所有搁坐点的最大穿透深度（参见/PEN 的 ddm 参数）。

/NPOINTS: np

The maximum number of ground points to issue. If not specified, all candidate points found within the clearance are issued up to the maximum unused ground points available.

要发出的最大搁坐点数。如果未指定，则在间隙内找到的所有候选点将发放至可用的最大未使用搁坐点。

(n)

The number of the ground point to access (setting empty if past the number defined).

要访问的搁坐点的编号（如果超过定义的数字，则设置为空）。

bvar, lvar, tvar, vvar, pvar, mvar

The names of variables (declared by the VARIABLES command) used to access the ground point's buoyant reaction force, coordinates, penetration, and maximum penetration (negative if downward). Asterisks can placehold for any unneeded variable names.

通过 VARIABLES 命令赋予搁坐点的参数到变量中，分别代表搁坐点的浮力，坐标，穿透深度和最大穿透深度（向下为负）。"*"可以放在任何不需要的变量之前。

/ACCESS

Accesses a ground point's data into variables without making changes.

只访问储搁点的数据变量而不作任何更改。

Operation

操作

A ground point exerts a vertical force whose magnitude depends on the "penetration" into the ground，relative to its own ground plane depth d0 assigned when the point is created. In this respect it is like a buoyant appendage with unlimited freeboard acting at a point. When the penetration is zero or negative, the force is zero. When the penetration is positive, it generates a vertical force proportional to the square of the penetration (if /LINEAR is not present).

搁坐力为竖直向上的力，其力大小取决于搁坐点穿透水底的深度，相对于搁坐点自身的深度 d0。就像在某点作用于船体的浮力，但它不受限于干舷。当穿透深度为 0 或负值时，其搁坐力为 0。

当穿透深度为正值时，会产生竖直向上的力，其值和穿透深度的平方成比例（如果没有出现/LINEAR）。

Normally the ground force is in the upward direction, like a buoyancy. A negative ground force, acting in the downward direction, is produced when either b or the ddm parameter is given as a negative number.

正常情况下，搁坐力方向为竖直向上，就像浮力。如果参数 b 或 ddm 为负值，会产生负的搁坐力，方向竖直向下。

A ground point can be removed via the DELETE command.

可以通过命令 DELETE 删除搁坐点。

If point description matches an existing item (ground point or added weight), that item is replaced. A warning message is issued unless the /NOWARN parameter is present. When replacing an existing ground point, the following parameters support *[±n] syntax to retain or offset from the current values: lcb, tcb, vcb, dd0, ddm.

如果定义的搁坐点的名称和已存在的项目名称重复（搁坐点或增加的重量项目），那么已存在的项目会被取代，同时会发出警告信息除非出现参数/NOWARN。如果需要用新的搁坐点去代替原有的搁坐点，下面的参数支持*[±n]语法保留或更改搁坐点的参数：lcb, tcb, vcb, dd0, ddm。

GROUND REPORT produces a report showing depths, distances and reaction, but not locations. The STATUS command shows ground points, including locations. If the amount of the reaction at any ground point is reduced to zero, the point does not appear in the STATUS display - even though it remains defined as a ground point.

GROUND REPORT 会生成报告显示搁坐点深度，距离和搁坐力，但不显示搁坐点的位置。（命令 STATUS 会显示搁坐点信息，包括坐标位置）。如果搁坐点的搁坐力为 0，那么在 STATUS 显示中不会显示该搁坐点，即使该搁坐点依然有效。

Finding a Ground Reaction

计算搁坐力

The depth at which a ground point begins to exert its buoyant force may be interpreted as the depth of the water. This force increases sharply if the point is forced deeper, according to:

搁坐力大小和搁坐点深度的关系可以用水深和浮力的关系来解释。随着搁坐点穿透深度的增加，搁坐力会急剧地增加：

when	dd0> 0	$b = c * dd0^2$	or
		b = c * dd0	if /LINER is included
when	dd0 ≤d0	b = 0	

where b is the buoyant force, dd0 is the penetration d - d0 into the ground, d is the depth of the ground point, d0 is the depth of the water, and c is a constant.

此处 b 为产生的浮力，dd0=d-d0 是穿透到海床的深度， d0 为水的深度，d 为搁坐点的深度，c 为常数。

The constant c is found such that when the penetration reaches its maximum depth ddm, the buoyant force is equal to the total fixed weight of the ship. If ddm is not specified or cannot be calculated (from b, dd0, and the current total fixed weight), then ddm is assumed to be 0.2% of the overall length of the ship.

c 为常数，如果穿透深度到达最大穿透深度 ddm，此时浮力与船舶的总重量相等。如果没有给定最大穿透深度，ddm=0.2%的船舶总长，据此进行计算。

In typical applications, great precision is not required in the value of ddm as long as it is small compared with the size of the ship. Likewise, the values given for b and dd0 are typically not critical unless dd0 is negative (i.e. the grounding has not yet occurred). In this case, -dd0 is the distance between the ground point and the ground and b must be zero.

在实际应用中，对 ddm 精确度的要求并非很高，因为和船的尺寸相比 ddm 非常小。同样，b 和 dd0 的值并不是很关键除非 dd0 为负值（即船舶还未搁浅）。这种情况下，-dd0 为搁坐点和水底的距离，同时力 b 肯定为 0。

Once the d0 value attached to a particular ground point has been derived, it does not change when the ship changes its heel, trim and draft. This reflects the fact that the depth of the water over the ground is not changing. However, when either the DEPTH or HEIGHT command is issued to change the level of the waterplane, the d0 values for all of the ground points are changed by the same amount to reflect a change in the depth of the water over the ground (e.g. tide change).

一旦得到某搁坐点距离水面的高度，它就不会随船舶横倾，纵倾和吃水的变化而变化，这反映出水底以上的水深没有变化。然而，当使用命令 DEPTH 或 HEIGHT 改变水面高度时，所有搁坐点 d0 的值会变化相等的量来反映水底以上水深的变化。（如，潮汐变化）。

Whenever a ground point exists, "GRND" appears in the box at the top of the screen. In Load Editor the value of the total added buoyancy Ground Reaction is shown in the

upper right hand corner. As the loading of the vessel changes or the waterplane is changed with the DEPTH or HEIGHT commands, the buoyant force for each ground point will be recalculated, just as the buoyancy of the hull and any other displacer part is recalculated.

当存在搁坐点时，"GRND"会显示在屏幕顶端的方格中。在装载编辑器中，所有搁坐点的支反力会显示在右上角处。随着船舶装载变化或命令 DEPTH 或 HEIGHT 改变水面深度，搁坐点的搁坐力会被重新计算，就像船体和其它浮体的浮力被重新计算。

Seafloor Ground Points

海床搁坐点

GROUND /FLOOR automatically issues ground points determined by the location and penetration of candidate points on the specified displacer component relative to the seafloor (first deleting any existing ground points whose description is prefixed with "part\component-" and retaining any others).

GROUND /FLOOR 在船体上（可以提供浮力的部位）自动指定相对于海底的候选点作为搁坐点，包括位置和穿透深度（首先删除描述以“部位\舱室-”为前缀的任何现有搁坐点，并保留任何其它搁坐点）。

For a geometry defined by a sparse number of points (such as a barge), points are interpolated at each section until the distance between points is within W/4, where W is the overall vessel width (which may be overridden using the WOA command in Part Maker). In cases where a large number of points are defined at each station, points closer than W/10 will be ignored.

对于由稀疏数量的坐标点（如驳船）定义的几何形状，则在每个截面处进行插值，直到坐标点之间的距离在 W/4 以内，其中 W 是整体舱室宽度（可以使用 PM 的 WOA 命令覆盖）。如果每个站点定义了大量坐标点，则小于 W/10 的点将被忽略。

The same thinning is performed for stations, where any station spaced within 2% of the overall length (or as adjusted by the LOA command) from a previous station is ignored. Candidate points are sorted using a multi-tiered approach. First, the points are sorted by maximum penetration. If multiple points have the same penetration, these points are sorted according to minimum transverse location, and then minimum longitudinal location. Finally, a "quality" factor Q, as determined by the formula Q=H+P, where H is the minimum distance from the current point to any higher-ranking point and P is the penetration at that point, is computed for each point. The first-issued ground point will always be the point with the largest penetration, the second will always be the point with the largest Q, and the remaining points will be sorted accordingly.

对站距也有同样的细化处理，如果站距在 2%的船长以内（如果对船长缺少定义则默认总长 LOA）的任何站都将被忽略。对候选点使用多层方法进行排序：首先，点按最大穿透深度排序；如果多个点具有相同的穿透深度，则根据最小横向位置和最小纵向位置，对这些点进行排序；最后，计算每个点的“质量”因子 Q，由公式 Q=H+P 确定，其中 H 是从当前点到任何更高排名点的最小距离，P 是该点的穿透深度。第一个发出的搁坐点将始终是穿透深度最大的点，第二个将始终是 Q 最大的点，其余点将相应地排序。

When using a seafloor file, if the position and/or heading of the ship results in a portion of the geometry falling outside the extents of the floor data, ground points will only be issued for the portion of the geometry that falls within the X-Y domain of the floor data. In the case of constant depth, the floor is assumed to extend to infinity.

使用海床文件时，如果船舶的位置和/或航向导致部分几何落在楼层数据范围之外，则只会为属于海底数据的 X-Y 域内的几何部分定义的搁坐点。在深度恒定的情况下，假设海床地板延伸到无穷大。

Multiple GROUND /FLOOR commands may be issued for multiple components of interest. Because the seafloor ground point naming convention includes the component name in the prefix, ground points previously issued for different components will not be deleted.

可以为多个感兴趣的舱室执行 GROUND /FLOOR 命令。由于海底搁坐点命名约定在前缀中包含舱室名称，因此不会删除以前为不同舱室的搁坐点。

Display Output

显示输出

In the REPORT mode, a table is produced that lists each ground point. The table includes the depth (relative to the waterplane) of the point itself, the depth of the ground, the present penetration of the point into the ground and the maximum penetration. The present ground reaction is also shown.

在 REPORT 模式中，会生成显示各搁坐点的表格。表格包含搁坐点的深度（相对于水面），水底深度，当前搁坐点穿透水底的深度和最大穿透深度，以及当前搁坐点的搁坐力。

Nondisplay Output:

无显示输出

none

无

Examples

样例

Defining a ground point with a known reaction:

定义一个搁坐力已知的搁坐点：

GROUND "Ground Point #1" 100, 50, -3, 0

Defining a ground point at a known reaction and penetration:

定义已知搁坐力和穿透深度的搁坐点：

GROUND "Keel aft" 45, 100, 0, 0 /PEN: 1.5

Defining a ground point not yet in contact with the ground:

定义一搁坐点，但并为搁浅：

GROUND "Keel aft" 0, 100, 0, 0 /PEN: -1

Defining a ground point at a penetration of 1.0 in a soft bottom where the maximum penetration is estimated to be 6.0:

定义一搁坐点搁浅于软泥水底，穿透深度为 1.0，最大穿透深度估计为 6.0：

GROUND "Ground Point #1" *, 50, 4, 0 /PEN: 1.0, 6.0

Raising a existing ground point by adjusting the penetration depth:

通过调整穿透深度来提升搁坐点：

GROUND "Keel aft" *, *, *, * /PEN: *+1

Issuing ground points using a constant depth with an equal clearance, thereby limiting issued ground points to locations on the submerged portion of the hull:

使用具有相等间隙的恒定深度发出搁坐点，从而将发出的搁坐点限制在船体淹没部分的位置：

GROUND /FLOOR: 10.0 /CLEAR: 10.0

Issuing the top eight ground points for a hull at a specified heading and position using longitude and latitude format and the seafloor data in the file seafloor.txt:

使用经度和纬度格式以及文件海底中的海底数据，在指定航向和位置发布船体的前八个搁坐点 seafloor.txt：

GROUND /FLOOR:DATA.TXT /HEAD:300 /LPOS:48d5'29.6808",-122d44'1.554" /NP:8

Issuing four ground points for both the hull component and skeg component of a vessel in constant depth conditions while specifying a maximum penetration:

在恒定深度条件下为船舶的船体组件和船艉呆木发出 4 个搁坐点，同时指定最大穿透深度：

GROUND (HULL\HULL.C) /FLOOR: 6.754 /NP: 4 /MAXPEN: 2.1

GROUND (HULL\SKEG.C) /FLOOR: 6.754 /NP: 4 /MAXPEN: 2.1

Assigning a ground point's data to variables:

将搁坐点的参数赋予变量：

VARIABLES B, L, T, V, CURPEN, MAXPEN

GROUND "Ground Point #1" B, L, T, V /PEN: CURPEN, MAXPEN /ACCESS

Producing a ground point report showing depths and penetrations.

生成搁坐点报告显示吃水深度和穿透深度：

GROUND REPORT

Producing a ground point report showing locations.

生成搁坐点报告显示搁坐点位置：

STATUS GROUND