

命令模式

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

Adds a buoyant force for modeling ground points.

增加一类似浮力的搁坐点。

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.

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。

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.

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 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.

MIN 或 MAX 可以代替 tcb，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 vcb，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.

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。

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。

/ACCESS

Accesses this reaction value for the REACT1 system variable (only requires "description").

存储搁坐力到系统变量 REACT1 中。（只需要参数"description"）

/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。

Operation

操作

A ground point exerts a vertical force whose magnitude depends on the "penetration" into the ground. 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.

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。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。

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.

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。

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.

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。

In the GROUND REPORT mode a report is produced showing depths and distances as well as reaction, but not locations. (The STATUS command also shows ground points, including locations.)

在 GROUND REPORT 模式中会生成显示搁坐点深度,距离和搁坐力的报告,但是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)。

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:

$$b = c * (d - d_0)^2 \quad \text{when} \quad d > d_0$$

or

$$b = 0 \quad \text{when} \quad d \leq d_0$$

where b is the buoyant force, c is a constant, d₀ is the depth of the water and d is the depth of the ground point (unless the /LINEAR parameter is present).

此处 b 为产生的浮力, c 为常数, d_0 为水的深度, d 为搁坐点的深度。(除非出现参数/LINEAR)。

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 dd_0 are typically not critical unless dd_0 is negative (i.e. the grounding has not yet occurred). In this case, $-dd_0$ 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 dd_0 的值并不是很关键除非 dd_0 为负值 (即船舶还未搁浅)。这种情况下, $-dd_0$ 为搁坐点和水底的距离, 同时力 b 肯定为 0。

Once the d_0 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 d_0 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 d_0 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。

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, muddy 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
```

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
```