

命令模式

DYNSTAB [modelist] [/SPEED:knots] [/BRIEF] [/LEVEL:level] [/MAXDI:displ]
[/SUM] [/RES:r1,r2,r3,r4,r5] [/PASSENGER] [/SHARPBILGE] [/NOPLOT]
[/FORMAL] [/NAVCAD:filespec]

Invokes a dynamic stability analysis according to IMO Second Generation Intact Stability criterion (requires the DS module, along with AF and SK).

根据 IMO 第二代完整稳性衡准调用动态稳性分析（需要 DS 模块以及 AF 和 SK。

参数说明

modelist

One or more of the following two-letter failure mode indicators: DS (Dead Ship), EA (Excessive Acceleration), PL (Pure Loss), PR (Parametric Roll), SB (Surf-riding/Broaching). If omitted, all modes are included.

以下一个或多个双字母故障模式指示器：DS（瘫船）、EA（过度加速度）、PL（纯稳性丧失）、PR（参数横摇）、SB（骑浪/横甩）。如果省略，则包括所有模式。

/SPEED: knots

Specifies the vessel forward speed in knots. Defaults to zero speed if omitted. Non-zero forward speed is required for PR level 2 failure mode.

以节为单位指定船舶前进速度。如果省略，则默认为零速度。PR（参数横摇）级别 2 故障模式需要非零前进速度。

/BRIEF

Formats the report such that each failure mode returns only the final limit attained table, omitting any intermediary tables.

设置报告的格式，使每个故障模式仅返回最终达到的衡准条件表，省略任何中间表。

/LEVEL: level

Specifies the desired analysis level to be considered, either 1 or 2 (or 2t for PR mode only). If omitted, the analysis will start with level 1 and automatically continue to level 2 if needed. PR failure mode continues if needed to special level 2t for level 2 nonlinear time domain solution.

指定要考虑的所需分析级别，1 或 2（或 2t 仅用于 PR 模式）。如果省略，分析将从级别 1 开始，并在需要时自动继续到级别 2。如果需要，PR 故障模式继续到特殊级别 2t，用于 2 级非线性时域解决方案。

/MAXDI: displ

Specifies the vessel's full load displacement or maximum displacement in current weight units. Required for EA, PL, and PR failure modes.

以当前重量单位指定船舶的满载排水量或最大排水量。EA、PL 和 PR 故障模式是必需的。

/SUM

Appends a summary table to the end of the report. The summary table displays the overall outcome for each failure mode in a single table.

将汇总表追加到报表末尾。汇总表在单个表中显示每种故障模式的总体结果。

/RES: r1, r2, r3, r4, r5

Specifies the vessel resistance curve using up to 5th order polynomial regression coefficients vs. forward speed (in ft/sec or m/sec). The units for each coefficient should be given such that $r1=WU-s/LU$, $r2=WU-s^2/LU^2$, $r3=WU-s^3/LU^3$, $r4=WU-s^4/LU^4$, and $r5=WU-s^5/LU^5$, where WU and LU are the current weight and length units, respectively. Required for SB level 2 failure mode.

使用高达 5 阶多项式回归系数与前进速度的关系（以英尺/秒或米/秒为单位）指定船舶阻力曲线。每个系数的单位应给出如下： $r1=WU-s/LU$ ， $r2=WU-s^2/LU^2$ ， $r3=WU-s^3/LU^3$ ， $r4=WU-s^4/LU^4$ ， $r5=WU-s^5/LU^5$ ，其中 WU 和 LU 分别是当前的重量和长度单位。SB（骑浪/横甩）级别 2 故障模式需要。

/PASSENGER

Indicates that the vessel under consideration is a passenger vessel. Important for PL level 2 analysis.

表示所考虑的船舶是客船。对于 PL（纯稳性丧失）2 级分析很重要。

/SHARPBILGE

Indicates that the vessel under consideration has a sharp bilge. Important for EA level 1 and PR level 1 and 2 analyses.

表示所考虑的船只具有尖锐的舱底。对于 EA（过度加速度）级别 1 和 PR（参数横摇）级别 1 和 2 分析很重要。

/NOPLOT

Omits all plots from report output.

从报告输出中省略所有绘图。

/FORMAL

Forces the use of simplified IMO methods. This parameter affects each failure mode differently. For DS, this applies to a level 2 analysis, thereby forcing the IMO simplified effective wave slope function calculation instead of the direct method which computes the roll moments using a strip method.

强制使用简化的 IMO 方法。此参数对每种故障模式的影响不同。对于 DS，这适用于 2 级分析，从而强制 IMO 简化有效波斜率函数计算，而不是使用带状方法计算滚动力矩的直接方法。

/NAVCAD: filespec

Allows import of propulsor and resistance information from NAVCAD export file for use in SB level 2 failure mode.

允许从 NAVCAD 导出文件导入推进器和阻力信息，以便在 SB 2 级故障模式下使用。

Operation

操作

DYNSTAB performs a dynamic stability analysis on the current condition according to IMO Second Generation Intact Stability criteria. Five different dynamic failure modes may be considered: Dead Ship (DS), Excessive Acceleration (EA), Pure Loss of Stability (PL), Parametric Roll (PR), and/or Surf-riding/Broaching (SB). The specific failure mode (or list of modes) may be specified using the two-letter mode acronyms. Each mode may be evaluated using a level 1 and/or level 2 analysis, with level 1 being a basic check of vulnerability and level 2 consisting of a more complex analysis. By default, each failure mode will be evaluated for level 1, and if level 1 fails, the analysis will automatically proceed to level 2 unless otherwise specified using the `/LEVEL` parameter..

DYNSTAB 根据 IMO 第二代完整稳定性衡准对当前条件进行动态稳定性分析。可以考虑五种不同的动态失效模式：瘫船（DS）、过度加速度（EA）、纯稳定性丧失（PL）、参数横摇（PR）和/或骑浪/横甩（SB）。可以使用两个字母的模式首字母缩略词指定特定的故障模式（或模式列表）。每种模式都可以使用 1 级和/或 2 级分析进行评估，1 级是对脆弱性的基本检查，2 级是更复杂的分析。默认情况下，将针对级别 1 评估每个故障模式，如果级别 1 失败，分析将自动进入级别 2，除非使用 `/LEVEL` 参数另行指定。

Because the analysis is dynamic in nature, it is important to consider the inertial properties of the vessel and loading condition, which are typically not important in a static analysis. It is recommended that users follow the guidance given for the SEAKEEPING command with respect to loading conditions, and be aware of the importance of an accurate and realistic inertial values.

由于分析本质上是动态的，因此考虑舱室的惯性特性和装载条件非常重要，这在静态分析中通常并不重要。建议用户遵循 SEAKEEPING 命令在装载条件方面的指导，并注意准确和现实的惯性值的重要性。

Many parts of a DYNSTAB analysis require a numerical prediction of the motions, damping, or wave excitation. Where appropriate, this is performed using the same solver that is invoked by the SEAKEEPING command. For this reason, the main hull must be modeled as a single component, preferably named HULL, unless DYNSTAB includes `/HULL:part[\component]` as a passthrough parameter to SEAKEEPING. See the SEAKEEPING command for details.

DYNSTAB 分析的许多部分都需要对运动、阻尼或波浪激励进行数值预测。在适当的情况下，使用由 SEAKEEPING 命令调用的相同求解器执行此操作。因此，主船体必须建模为单个组件，最好命名为 HULL，除非 DYNSTAB 包含 `/HULL: part[\component]` 作为 SEAKEEPING 的直通参数。有关详细信息，请参阅“SEAKEEPING”命令。

The IMO methods often use the aft and/or mid perpendicular(s) as reference points. While DYNSTAB uses logic to select a best-possible AP, MP, and FP if not explicitly given, the user is encouraged to use the LBP command if the default behavior is unsatisfactory.

IMO 方法通常使用船尾和/或船中作为参考点。虽然 DYNSTAB 使用逻辑来选择最佳可能的 AP、MP 和 FP（如果未明确给出），但如果默认行为为不令人满意，则鼓励用户使用 LBP 命令。

The methods implemented by DYNSTAB are in accordance with the criterion set forth by the IMO. Users are encouraged to reference the IMO SGIS guidelines for more information on the underlying theory and methods. A summary of operational details for each failure mode is given below:

DYNSTAB 实施的方法符合 IMO 规定的标准。鼓励用户参考 IMO SGIS 指南，以获取有关基本理论和方法的更多信息。下面给出了每种故障模式的操作详细信息摘要。

Dead Ship (DS)

瘫船

DS failure mode considers a ship that has lost power and is positioned in beam seas, rolling and drifting under the action of wind and waves. At least one downflooding point is required to perform the analysis and must be defined beforehand using a Critical Point. In addition, the vessel must have a marked deck edge. The ROLL IMO command should also be called prior to DYNSTAB to set specific roll parameters, and the /S parameter should be used to force the IMO SGIS wave steepness table. For more information see the ROLL command. The optional /FORMAL parameter forces the use of the simplified IMO method for computing the effective wave slope function, instead of the default direct method.

DS 故障模式考虑的是一艘失去动力的船，被定位在海中横浪，在风浪的作用下横摇漂移。执行分析至少需要一个关键点，并且必须事先使用临界点进行定义。此外，船舶必须具有明显的甲板边缘。还应在 DYNSTAB 之前调用 ROLL IMO 命令以设置特定的横摇参数，并且应使用 /S 参数强制 IMO SGIS 波浪陡度表。有关详细信息，请参阅 ROLL 命令。可选的 /FORMAL 参数强制使用简化的 IMO 方法来计算有效波斜率函数，而不是默认的直接方法。

Excessive Acceleration (EA)

过度加速度

EA failure mode considers the vulnerability of a ship to large lateral accelerations due to synchronous resonance. Lateral accelerations are computed at locations where crew or passengers are expected to be present. At least one location must be specified using a Critical Point defined with description prefix "EA-" and the /NOFLOOD parameter. The ROLL IMO command may be used to give specific values for /AK and /CB, or specify the /S wave steepness table, which affect level 1. The optional /SHARPBILGE parameter may be used to specify vessels with sharp bilges to affect roll damping in level 1.

EA 故障模式考虑船舶由于同步共振而承受大横向加速度的失效性。横向加速度是在船员或乘客所在位置计算的。必须使用由描述前缀“EA-”和 /NOFLOOD 参数定义的临界点至少指定一个位置。ROLL IMO 命令可用于为 /AK 和 /CB 提供特定值，或指定影响级别 1 的 /S 波陡度表。可选的 /SHARPBILGE 参数可用于指定具有舱底舦龙骨的船舶，以影响 1 级的横摇阻尼。

Pure Loss (PL)

纯稳性丧失

PL failure mode considers the vulnerability of a ship to capsize via complete loss of stability due to a sudden and significant change in waterplane by the action of waves. The optional /MAXDI parameter should be used to specify the full load displacement if

different from the current loading condition. The optional /PASSENGER parameter affects level 2 vulnerability and should be used when analyzing a passenger vessel.

PL 失效模式考虑了由于波浪作用使水平面突然发生重大变化而导致船舶完全失去稳定性而倾覆的失效。如果与当前载荷条件不同，则应使用可选的/MAXDI 参数来指定满载位移。可选的/PASSENGER 参数会影响 2 级失效，应在分析客船时使用。

Parametric Roll (PR)

参数横摇

PR failure mode considers the vulnerability of a ship to parametric roll resonance in waves. The /SPEED and /MAXDI parameter are required to specify the service speed and full load displacement, respectively. The optional /SHARPBILGE parameter may be used to specify vessels with sharp bilges to affect roll damping in level 1 and level 2. The special /LEVEL:2t is available to force a 3-DOF (heave, roll, and pitch) nonlinear, time-domain simulation of parametric roll response in head and following long-crested seas. This is a time consuming simulation which should only be performed if required.

PR 失效模式考虑船舶对波浪中参数化横摇共振的失效。需要/SPEED 和/MAXDI 参数分别指定服务速度和满载位移。可选的/SHARPBILGE 参数可用于指定具有舱底舭龙骨的舱室，以影响 1 级和 2 级的横摇阻尼。特殊的/LEVEL: 2t 可用于强制对头部和长波峰海域的参数滚动响应进行 3 自由度（升沉、横摇和俯仰）非线性时域仿真。这是一个耗时的模拟，只应在需要时执行。

Surf-riding/Broaching (SB)

骑浪/横甩

SB failure mode considers the vulnerability of a ship to surf-riding, during which a following wave accelerates a ship forward, and broaching, which is a violent uncontrollable turn that often follows surf-riding and may cause stability failure. Evaluation of this failure mode requires information about the ship's propulsor(s), which should be specified using the PROPULSOR command prior to calling DYNSTAB. See the PROPULSOR command for more information. The /RESISTANCE parameter is required for a level 2 analysis and is used to specify the ship's resistance curve.

SB 失效模式考虑船舶对骑浪的失效，在此期间，跟随波浪加速船舶前进，以及横甩，这是通常在骑浪之后发生的剧烈的不可控转弯，可能导致稳定性故障。评估此故障模式需要有关船舶推进器的信息，在调用 DYNSTAB 之前，应使用推进器命令指定这些信息。有关详细信息，请参阅推进器命令。/RESISTANCE 参数是 2 级分析所必需的，用于指定船舶的阻力曲线。

Display Output

显示输出

DYNSTAB always summarizes important ship and condition parameters at the top of the report. The subsequent report sections then depend on the failure modes and level being analyzed. Titles separate and identify failure modes, and each failure mode comprises its own report section. Within each failure mode section, the level is identified before summarizing parameters and report output specific to the mode and level. The EA mode is unique in that it includes an additional applicability check, which is presented as a table before any level 1 or level 2 output.

DYNSTAB 总是在报告的顶部总结重要的船舶和状况参数。然后，后续报告部分取决于所分析的故障模式和级别。标题分离并标识故障模式，每个故障模式都包含自己的报告部分。在每个故障模式部分中，在汇总特定于模式和级别的参数和报告输出之前，先确定级别。EA 模式的独特之处在于它包括一个额外的适用性检查，在任何级别 1 或级别 2 输出之前显示为表格。

Level 1 report output is relatively brief for all modes, with information given as parameter summaries, tables, or both, depending on the needs of the mode.

对于所有模式，1 级报告输出都相对简短，根据模式的需要，以参数摘要、表格或两者的形式提供信息。

Level 2 report output is more detailed, and always includes a detailed Long Term Vulnerability Index table, which summarizes the calculations for each short-term seaway within the overall environment. This environment data is prescribed by the IMO. The table is organized such that the attained weighted probability index is given in the final column for each seaway, and the final line in the table is the weighted sum of the indices -- yielding the final attained value. For some modes, additional calculations are presented prior to the Long Term Vulnerability Table. In these cases, the output is presented in the order that calculations take place, such that what comes first is used by what follows.

2 级报告输出更详细，并且始终包括详细的长期脆弱性指数表，该表汇总了整体环境中每个短程的计算。该环境数据由国际海事组织规定。该表的组织方式是，在每个航程的最后一列中给出已达到的加权概率指数，表中的最后一行是指数的加权和 - 产生最终达到的值。对于某些模式，在长期失效表之前提供了其他计算。在这些情况下，输出按计算发生的顺序呈现，以便后面的内容使用第一个的内容。

Both level 1 and level 2 analyses conclude with an attained criteria table, summarizing criterion, required values, and the attained values, before indicating whether the vessel passed or failed the criterion. In some modes multiple criteria are considered.

1 级和 2 级分析都以达到的标准表结束，总结标准、要求值和达到的值，然后指示船舶是否通过衡准。在某些模式下，会考虑多个衡准。

The optional /SUM parameter adds a summary table at the end of the report which includes all modes in a single table and summarizes the overall result for the vessel. The optional /BRIEF parameter omits detailed report output and retains only the attained value tables in a compact format when minimal output is desired.

可选的/SUM 参数在报告末尾添加一个汇总表，该汇总表在单个表中包含所有模式，并汇总船舶的总体结果。可选的/BRIEF 参数省略详细的报告输出，并在需要最小输出时仅以紧凑格式保留已获得的值表。

Examples

样例

Running a level 1 analysis for all modes with a service speed of 12 knots, a downflooding point for the DS mode, a crew location for the EA mode specified using a Critical Point, and a summary table included in the report:

对所有模式运行 1 级分析，服务速度为 12 节，DS 模式的临界点，使用临界点指定的 EA 模式的船员位置，以及报告中包含的汇总表：

```
CRT "downflood" 20f,8s,13 /SYM
CRT "EA-Bridge" 30f,0,13 /NOFLOOD
ROLL IMO /S
DYNSTAB /LEVEL:1 /SPEED:12 /SUM
```

Running a sequential level 1 and (if required) level 2 vulnerability check for the Dead Ship failure mode using a bilge keel area of 150 and the IMO SGIS wave steepness curve:

使用 150 的舱底舳龙骨面积和 IMO SGIS 波浪陡度曲线，对瘫船故障模式运行顺序 1 级和（如果需要）2 级失效检查：

```
CRT "downflood" 1.5f,3s,9 /SYM
ROLL IMO /AK:150 /S
DYNSTAB DS
```

Specifying the full load displacement for use in a Pure Loss and Parametric Roll vulnerability check with a service speed of 16 knots:

指定用于纯损失和参数横摇失效检查的满载排水量，服务速度为 16 节：

```
DYNSTAB PL,PR /SPEED:16 /MAXDI:300
```

Running a level 2 Surf-riding/Broaching analysis for a single-screw vessel using a 5th order resistance curve:

使用 5 阶阻力曲线对螺旋桨船舶进行 2 级骑浪/横甩分析：

```
PROP 2.6,0,0,0 /THRUST:0.2244,-0.2283,-0.1373 /WF:0.156 /TD:0.142
DYNSTAB SB /LEVEL:2 /SPEED:12 /RES:-0.0437,0.0766,-0.0273,0.004175,-0.00017
```

Forcing a nonlinear, time-domain simulation to evaluate the Parametric Roll failure mode with a service speed of 20 knots:

强制非线性时域仿真以评估服务速度为 20 节的参数横摇故障模式：

```
DYNSTAB PR /LEVEL:2t /SPEED:20
```