GUIDE FOR THE

ASSESSMENT OF PARAMETRIC ROLL RESONANCE IN THE DESIGN OF CONTAINER CARRIERS SEPTEMBER 2004

NOTICE NO. 1 – June 2008

The following Changes become **EFFECTIVE AS OF 1 JUNE 2008.**

(See http://www.eagle.org/absdownloads/index.cfm for the consolidated version of the Guide for the Assessment of Parametric Roll Resonance in the Design of Container Carriers, with all Notices and Corrigenda incorporated.)

Notes - The date in the parentheses means the date that the Rule becomes effective for new construction based on the contract date for construction, unless otherwise noted. (See 1-1-4/3.3 of the ABS Rules for Conditions of Classification (Part 1).)

SECTION 3 NUMERICAL SIMULATIONS *(1 June 2008)*

(Revise Section 3, as follows:)

If the susceptibility to parametric roll has been determined in Section 2, numerical simulations are required.

As guidance, it is recommended that a numerical simulation system based on potential hydrodynamic formulation be used, capable of calculation of *hydrostatic* and *Froude-Krylov* forces and moments over an instantaneous submerged body. *Hydrodynamic* forces and moments can be calculated over the average waterline. The simulation system should be capable of taking into account viscous and eddy-making components of roll damping as external terms from the roll decay test. Sample of such simulation technology is described in ([1]).

Numerical simulations are to be performed for representative loading conditions included in Stability and Trim Booklet and should include at least three degrees of freedom: heave, roll and pitch.

Numerical simulations are to be carried out for irregular seas for the entire range of service speeds; recommended increment is 5 knots.

Numerical simulations in irregular seas are to be performed for long-crested waves. Bretschnieder or JONSWAP spectrum is to be used. Simulations are to be carried out for the range of wave directions from 0 degrees (following seas) to 180 degrees (head seas) in 15 degrees increments and for a number of sea states starting from sea state 6 and above.

[1] Y.S.Shin, V.L.Belenky , Y.M.Lin, K.Weems, A.Engle "Nonlinear Time Domain Simulation Technology for Seakeeping and Wave Load Analysis for Modern Ship Design", SNAME Annual Meeting 2003, San-Francisco.

Simulation for each loading condition, sea state, speed and wave direction should be repeated at least 5 times with the same spectrum but with the different set of initial phase angles. The duration of each calculation is to be at least 12 minutes, so the total time for each condition is to be at least 3600 seconds.

The set of frequencies chosen for representation of irregular waves has to cover the entire spectral range where values of spectral density exceed 1% of maximum spectral density.

The set of frequencies must provide statistically representative restoration of time series of wave elevations. If frequencies are evenly distributed, the frequency step is to be calculated as:

$$\Delta\omega = \frac{2\pi}{T_R}, \text{ rad/s}$$

where T_R, is duration of calculation in seconds.

The maximum roll angle is to be determined from all these runs.

The plan for numerical simulations, including loading conditions as well as wave characteristics, should be approved by ABS prior to conduction the simulations.

SECTION 4 MITIGATION OF PARAMETRIC ROLL RESONANCE

(Revise Subsection 4/1, as follows:)

1 Operational Guidance *(1 June 2008)*

If a ship is found to be susceptible to parametric roll resonance, the Master should be supplied with the operational guidance indicating dangerous regimes for the representative loading conditions, and sea state where parametric roll may represent danger.

Such operational guidance may be developed for use by the Master in the form of hard copy or electronic information.

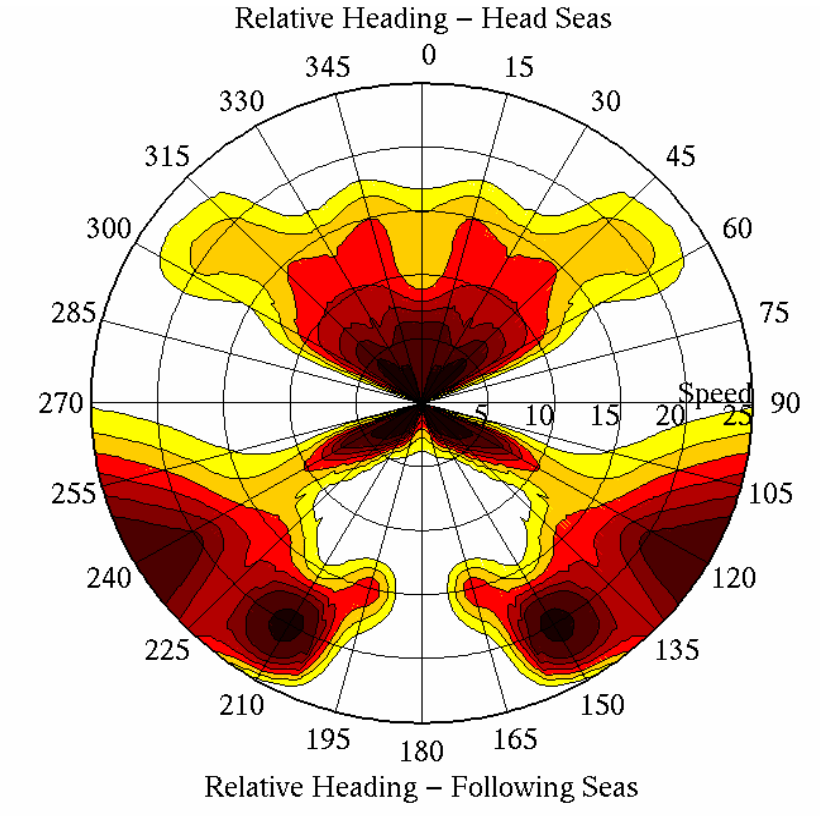
The operational guidance may be presented in the form of 'polar diagram' (wave heading angle vs. speed for each sea state and loading condition), based on numerical simulations in irregular seas as described in Section 3. The diagram shows area of different colors corresponding to maximum observed roll angles exceeding 22.5 degrees. Scale of angles and colors is to chosen as appropriate for practical use. Example of color scale along with the sample polar diagram is shown in Section 4, Figure 1. Each polar diagram must be clearly marked with loading conditions and significant wave height and characteristic wave period.

Operational Guidance is subject to ABS approval as a condition of optional class notation.

As the operational guidance may contain significant amount of information, an electronic or computerized version of the guidance is acceptable in addition to the written guidance to enhance availability of information and reduce the chance of human error.

(Add new Section 4, Figure 1, as follows:)

FIGURE 1
Example of Polar Diagram and Color Scale *(1 June 2008)*



White:	Roll < 22.0 degrees
Yellow:	Roll 22.0 - 25.0 degrees
Orange:	Roll 25.0 - 27.5 degrees
Bright Red:	Roll 27.5 - 30.0 degrees
Medium Red:	Roll 30.0 - 32.5 degrees
Dark Red:	Roll 32.5 - 35.0 degrees
Very Dark Red:	Roll 35.0 - 40.0 degrees
Extremely Dark Red:	Roll > 40.0 degrees