

# Meeting with Petroleumstilsynet (PTIL)

Stofat error

Teams meeting 21.08.2020

04 December 2017

## Introduction

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- Stofat is a module in SESAM mostly used for stochastic fatigue analysis
- An error in Stofat related to the wave-energy spreading was identified in April-20
- The following actions have been taken to inform about the error, and to mitigate;
  - An internal task force was established to identify customers and projects affected by the error where DNV GL has been involved either as provider of design calculations or in a third party role (verification / Classification)
  - All licence holders were informed in email (April / May)
  - For all projects with DNV GL involvement, mitigating actions have been taken e.g. re-analysis, re-approval to ensure that the requirements are fulfilled. All relevant customers have been informed and kept in the loop during the mitigating process. The number of projects identified is relatively low.
  - Some stakeholder, without any direct contract with DNVGL, has also been informed e.g. Equinor, Ptil.

## STOFAT error

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- The Stofat error is present in releases from 3.5.07 (June-16). An updated version 4.0-04 was released in June-20. Please note that some licence holders does not install new version until long after the actual release date.
- Stofat is normally used for stochastic fatigue analysis. Such analysis is normally carried out with some type of wave energy spreading definition around the main wave direction.
- **When applying wave energy spreading to the main wave direction, the error in Stofat leads to loss of energy from those direction represented in Wadam / Sestra given zero probability in Stofat. (see also slide 5)**
- This loss of wave energy will lead to reduced calculated fatigue damage and consequently non-conservative estimation of fatigue life
- The nature of the error is that the results will always be non-conservative for cases where the error occurs
- The error has a generic nature, however during our investigation only weather-vaning FPSOs have been identified as being affected (see also slide 5)

# Sesam Status list

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The Stofat error related to wave spreading is described in the Sesam Status List as follows:

## **Wave spreading for wave directions with zero probabilities**

- *Type: error*  
*Assigning zero probabilities to directions existing on Results file, combined with wave spreading lead to error.*

*The error takes place only when one or more wave directions are assigned zero probability and at the same time wave spreading is assigned.*

*The wave energy spreading from directions with zero probability to other directions is by mistake disregarded. The order of the wave directions might be changed and the wave direction option not accounted correctly. In general, the error will underestimate the results. However, the effect of the error depends highly on the number of directions with zero probability and distribution of wave energy between wave directions.*

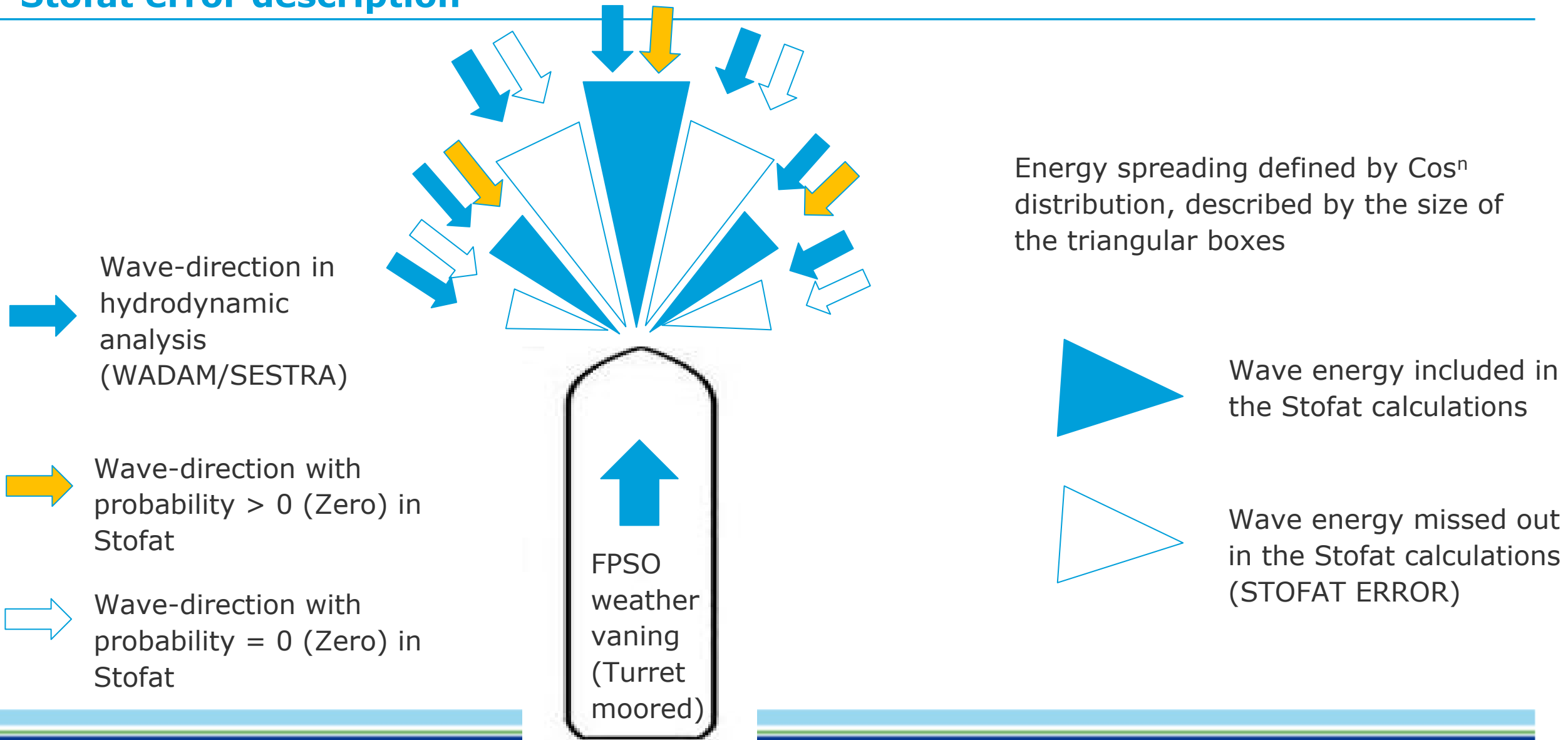
*Workaround:*

*The error may be avoided by assigning small probabilities to directions with zero probability (not less than 10E-7).*

*This issue will be fixed in the next release.*

**From version: 3.5-07(June-16) until version: 4.0-03. New corrected version 4.0-04 (June-20)**

# Stofat error description



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