
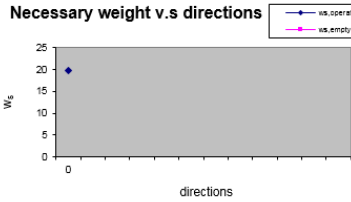


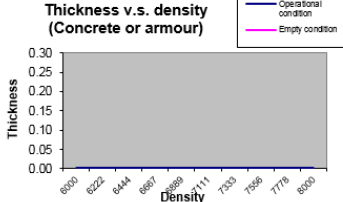


ULTRA DEEP LLC
ON - BOTTOM STABILITY ANALYSIS
Presentation

- Ultra deep performs on bottom stability analysis of umbilicals according to the DNV-RP-F109 standard.
- This is done by the means of DNV made software STABLELINE 1.2 which implements DNV-RP-F109.
- Three types of stability analysis can be done:
 - 10xOD displacement: Maximum displacement of 10 times outer diameter.
 - 0.5xOD displacement: Maximum displacement of 0.5 times outer diameter.
 - Absolute stability: No lateral movement. This is often the only on bottom assessment possible on umbilicals due to low submerged weight.
- Both current and wave forces are included in the analysis.

Open Case		Save Case		STABLELINES Vers. 1.2 On-Bottom Stability of Submarine Pipelines <small>DNV version Expiry date: 31/12/2099 Release Note</small>		<small>Programmed by DNV Deep Water Technology</small> <small>Knut Vedeld (Knut.Vedeld@dnv.com)</small> <small>Håvar Sollund (Havar.Sollund@dnv.com)</small> <small>Olav Azamita (Olav.Azamita@dnv.com)</small>											
Calculate		Parametric Runs															
Input file name				Project: Generating Program		Date: 01/09/2009		Calculations by: NN									
Output file name				References: Verification of version				Verified by: NN									
Input path				Return Period Values for Wave and Current Number of directions considered: 1						1							
Output path																	
Pipeline data				Soil interaction		Environmental Parameters		Direction [deg]	H _{s,1-year} [m]	H _{s,10-year} [m]	H _{s,100-year} [m]	T _{p,1-year} [s]	T _{p,10-year} [s]	T _{p,100-year} [s]	U _{c,1-year} [m/s]	U _{c,10-year} [m/s]	U _{c,100-year} [m/s]
θ _{pipe} [deg]	90	ρ _{water} [kg/m ³]	1025	z ₀ [m]	5.00E-06	z _r [m]	5	0	0.0001	0.01	0.01	10	10	10	0	0	0.71
D _o [m]	0.0587	ρ _{jacket} [kg/m ³]	47550	z _i [m]		d [m]	1360										
t _{jacket} [m]	0.0000	ρ _{armour} [kg/m ³]	47550	z _p [m]		θ [deg]											
t _{armour} [m]	0.0000	w _{dry} [N/m]	47.1	r _{tot,y}	0.94	γ	3.3										
Coating data				d ₅₀	0.0625	T _{storm} [hrs]	8										
				r _{perm,z}	1	Stability Criterion											
Coating thickness [m]	Coating Density [kg/m ³]	μ	0.20	Absolute Stability													
t _{coat,1}	ρ _{coat,1}	γ _s [N/m ³]		τ	1533												
t _{coat,2}	ρ _{coat,2}	γ _s [N/m ³]	2500	S _{q,operation}	1.73												
t _{coat,3}	ρ _{coat,3}	s _b [N/m ²]	1100	γ _{sc,empty}	-												
t _{coat,4}	ρ _{coat,4}	G _c	7.50	γ _{sc,operation}	1												
t _{coat,5}	ρ _{coat,5}			Initial penetration for water-filled pipe <input type="checkbox"/>		Initial penetration for water-filled pipe <input type="checkbox"/>											

Necessary weight v.s directions 	Design condition for empty pipe		Design condition for pipe in operation	
	100-year and 100-year RPV Combination		100-year and 100-year RPV Combination	
	Results - Empty pipe		Results - Pipe in operation	
	w _s [N/m]		w _s [N/m]	20
w _{necessary} [N/m]		w _{necessary} [N/m]	20	
t _{conc} [m]		t _{armour} [m]	0.000	
t _{steel,added} [m]		w _{dry,final} [m]	47	
w _{s,vertical} [N/m]		w _{s,vertical} [N/m]	3	

Thickness v.s. density (Concrete or armour) 	Operational condition	
	Empty condition	