verification of numerical wave propagation models with field measurements

CREDIZ verification Haringvliet

W 488 part 1c, figures

December 1983
verification of numerical wave propagation models with field measurements

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M. W. Dingemans

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Bottom contours 1981 bottom, 500 m mesh, with STROBO

FIG. 2
Bottom contours 1981 bottom, 500 m mesh, with STROBO

MAASVLAKTE

N

SLUICES

GOEREE

FIG. 3
Bottom contours 1981 bottom, 250 m mesh, with CREDIZ

FIG. 4
Bottom contours 1982 bottom, 250 m mesh, with CREDIZ

MAASVLAKTE

GOEREES

FIG. 7
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Aantal Registraties : 38   Totaal : 38   Waarvan : 31 Registraties Niet Verwerkt
GOLVEN-38 Nr. 24: EENZIJDIG VERMOGENSDICHTHEIDSSPECTRUM met 70%-betrouwb. grenzen.
Stnr. : 63
Datum: 820922  550
Rd : 17min
Hs/s : 126 cm Ws: 150cm
Ws : 310grd Ws : 7m/s
Mm : 1191cm2 Av : 20
AFDELING HELLEVOETSLUIS

WR1

\[ H_m = 138 \text{ cm} \]
GOLVEN-38 Nr. 25: EENZIJDIG VERMOGENSDICHTHEIDSSPECTRUM met 70%-betrouwb. grenzen.
Stnr.: 66
Datum: 820922 610
Rd : 19min
Hl/a : 50 cm Wsl: 135cm
Wdr : 310grd Ws : 7m/s
Mq : 176cm2 Av : 22
AFDELING HELLEVOETSLUIS

WR 4

\[ H_{m0} = 53 \text{ cm} \]
SPREIDING IN GOLFRICHTING (STRAFREQUENTIE ENERGIE)
rijkswaterstaat
directe waterhuishouding en waterbeweging
district kust en zee — ordering kust en zee

mond kicking Crediz
Golfparameters Hm₀ en H₁

FIG. 21
Figuur 22
$Q_b = \left( \frac{H_{rms} / H_m - C_b}{1 - C_b} \right)^2 ; H_{rms} = H / \sqrt{2}$

B & J: $O_b = \exp \left[ -\frac{1 - Q_b}{b^2} \right] ; b = H_{rms} / H_m$

FIG. 23
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIEF W0488
COMPARISON QB FORMULATION AFTER B&J(1978) AND CREDIZ

DELFT HYDRAULICS LABORATORY

RUN H01
DELTAX=50
ALFA=1.0
GAMMA=0.8

M1882
FIG. 24
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIELT W0488
COMP. QB&HB&PV FORMULATION AFTER B&J(1978) AND CREDIZ
DELFT HYDRAULICS LABORATORY

W 488 FIG. 25
ENERGY DECAY (NO SET-UP) IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIEF W0488
COMPARISON QB FORMULATION AFTER B&J(1978) AND CREDIZ
DELFT HYDRAULICS LABORATORY

RUN HV04  DELTAX=50
ALFA=1.0  GAMMA=0.8

M1882  FIG. 26
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVLIEF W0488
FORMULATION AFTER B&J (1978) AND CREDIZ

DELFT HYDRAULICS LABORATORY

RUN HV04-1 DELTAX=50
ALFA=1.0 GAMMA=0.8 T=8 S

W 488 FIG. 28
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET WO488
FORMULATION AFTER B&J(1978) AND CREDIZ

Delft Hydraulics Laboratory
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVLIET WO488
FORMULATION AFTER B&J (1978) AND CREDIZ (28-03-83)

DELFt HYDRAULICS LABORATORY
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVLIET W0488
FORMULATION AFTER B & J (1978) AND CREDIZ (28-03-83)

DELTAX = 50
ALFA = 1.0, GAMMA = 0.8, T = 8 s

DELFt HYDRAULICS LABORATORY

W 488 FIG. 31
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET W0488
FORMULATION AFTER B&J (1978) AND CREDIZ (28-03-83)
DELFT HYDRAULICS LABORATORY

RUN HV08B-1    DELTAX=50
ALFA=1.0, GAMMA=0.8, T=8 S

W 488    FIG. 32
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVLIET W0488: HM WITHOUT PV FORMULATION AFTER B&J (1978) AND CREDIZ (28-03-83)

DELFT HYDRAULICS LABORATORY

W 488 FIG. 33
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET W0488
COMPARISON CREDIZ (28-03-83): HM WITH AND WITHOUT PV

DELFT HYDRAULICS LABORATORY
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIELT WD488
COMPARISON CREDIZ AND 1-D PROGRAMMES

DELFT HYDRAULICS LABORATORY
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET W0488
COMPARISON CREDIZ AND 1-D PROGRAMMES
DELFT HYDRAULICS LABORATORY

RUN HV18A-26    DELTAX=50
ALFA=1.0, GAMMA=0.7, T=7 S

W 488    FIG. 48
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET W0488
COMPARISON CREDIZ AND 1-D PROGRAMMES

DELFT HYDRAULICS LABORATORY
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIEI W0488
COMPARISON CREDIZ COMPUTATIONS

DELFT HYDRAULICS LABORATORY W 488 FIG. 50

CREDIZ. T23
CREDIZ. T26
MEASURED <HRMS>

---

X (M)
-1000 -2000 -3000 -4000 -5000 -6000 -7000 -8000 -9000

Y (M)
0 1.0 1.5

-1600 -1200 -800 -400 0 4 8 12 16

---
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET W0488
COMPARISON CREDIZ COMPUTATIONS

DELFT HYDRAULICS LABORATORY
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET W0488
COMPARISON CREDIZ COMPUTATIONS

DELFT HYDRAULICS LABORATORY
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVLIEF W0488: RAY HE
COMPARISON CREDIZ WITH 1-D

DELFT HYDRAULICS LABORATORY

RUN HE39-26 DELTAX=50
ALFA=1.0 GAMMA=-.7 T=7 S

W 488 FIG. 53b
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVELT WO488: RAY HE SENSITIVITY STUDY T2=4.7 S, FW = .005

DELTAX=50
ALFA=1.0, GAMMA=.7, T=7 S

DELT HYDRAULICS LABORATORY
W 488 FIG. 54 b
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVLJET W0488
SENSITIVITY STUDY

DELFT HYDRAULICS LABORATORY

RUN EE39-26 DELTAX=50
ALFA=1.0 GAMA=7.7 T=7 S

W 488 FIG.55 a
FIG. 58 e
FIG. 62 a
WAVEC

WR 1

Ha-1

14 October 1982

15 October 1982

WAVE HEIGHT: • measured
x calculated (version C-3)

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district kust en zee - afdeling hellevoetsluis

CREDISZ VERIFICATION HARINGVLIEKT
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sensors WAVEC, WR1, Ha-1

get. gec. gez. akk.

W 488

FIG. 68
WAVE HEIGHT:  • measured  
               x calculated (version C-3)

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district kust en zee – afdeling hellevetsluis

CREDIZ VERIFICATION HARINGVLIEGT
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get. sensors WR2, WR5, WR6
gec. gez  W 488
gez. akk.


FIG. 6.9
WAVE HEIGHT: • measured x calculated (version C-3)

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district kust en zee - afdeling hellevoetsluis

CREDIZ VERIFICATION HARINGVLIET
Hindcast 14/15 October 1982

sensors WR3, WR4, E-75

W 488

FIG. 70
RIJKSWATERSTAAT
DIRECTIE WATERHUISHOUDE H E N W A T E R B E W E G I N G
DISTRICT KUST EN ZEE - AFDING HELLEVOETSLUIS
CREDIZ VERIFICATION HARINGVLIET
Hindcast 14/15 October 1982

LEG

EURO-3

G-77

* measured wave height
* mean water level

14 October 1982 - 15 October 1982

Sensors LEG, EURO-3, G-77

W 488

FIG. 71
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIEI W0488
SENSITIVITY STUDY FW=.005

DELFT HYDRAULICS LABORATORY

RUN HY188-26 DELTAX=50
T=7 S. GAMMA=.70

W 488 FIG. 96
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVLIEI T W0488
SENSITIVITY STUDY FW=.005

DELTAX=50
I=7 S. GAMMA=.70

DELTFT HYDRAULICS LABORATORY W 488 FIG. 98
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVLIEI W0488
SENSITIVITY STUDY FW=0.005

DELFt HYDRAULICS LABORATORY W 488 FIG.100
Current vectors in bottom region at timestep 480
Current vectors in output region at timestep 480

1 cm $\equiv 1 \text{ m s}^{-1}$
T 11   PV = 0

FIG. 106
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIEI W488
SENSITIVITY STUDY

DELFT HYDRAULICS LABORATORY

RUN HV188-26 DELTAX=50
T=7 S. FW=0.005

W 488 FIG. 112
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIEF W0488
COMPARISON ALFA = 1 AND ALFA = 2
DELFT HYDRAULICS LABORATORY

RUN HV18B-19 DELTAX=50
GAMMA=.80,FW = .01,T=7 S

W 488 FIG. 113
ENERGY DECRY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET W0488
SENSITIVITY STUDY
RUN HY188-26 DELTAX=50
T=7 S. FW=0.005
DELFT HYDRAULICS LABORATORY W 488 FIG. 114
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET W0488
COMPARISON CREDIZ (28-03-83)

DELTAX=50
ALFA=1.0, PV=0, T=8 S

DELTFT HYDRAULICS LABORATORY
W 488 FIG. 115
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET WO488
COMPARISON CREDIZ (28-03-83)
DELFT HYDRAULICS LABORATORY W 488 FIG. 116
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIEF 00488: RAY TO PILE E
COMPARISON CREDIZ (28-03-83)

DELFT HYDRAULICS LABORATORY
W 488 FIG. 117
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGWIJET W0488: RAY TO PILE E
COMPARISON CREDIZ (28-03-83)

DELFT HYDRAULICS LABORATORY

\[ \text{GAMMA} = 0.80, \text{FW} = 0 \]
\[ \text{GAMMA} = 0.80, \text{FW} = .01 \]
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVLIET W0488
COMPARISON CREDIZ (28-03-83), RAY HH

DELFT HYDRAULICS LABORATORY

W 488 FIG. 119
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIEF W0488
SENSITIVITY STUDY

DELFT HYDRAULICS LABORATORY
RUN HE39-T29 DELTAX=50
T=8.3 S
W 488 FIG.121
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CREDIZ VERIFICATION HARINGVLEET W0488
SENSITIVITY STUDY

DELFT HYDRAULICS LABORATORY

\[ \begin{align*}
FW = 0.005, \quad &W = 14.5 \\
FW = 0.0, \quad &W = 0 \\
\text{MEASURED} \quad &<HRMS>
\end{align*} \]
ENERGY DECAY AND SET-UP IN RANDOM WAVES

CRED12 VERIFICATION HARINGVELT W0488; RAY HE
SENSITIVITY STUDY

DELTAX=50
T=8.3, FW=.005, W=14.5

DELT HYDRAULICS LABORATORY

W 488 FIG. 126
WAVEC

WR 1

Ha-1

14 October 1982 → 15 October 1982

WAVE HEIGHT:
• measured
× calculated (version C-3)
△ calculated (version C-1)

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CREDIZ VERIFICATION HARINGVLIET
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sensors WAVEC, WR1, Ha-1

get
gec
gez

W 488

akk.

FIG. 128

A1 nr. 83-7923
A1 nr. 83-7931
WAVE HEIGHT:
- measured
- calculated (version C-3)
- calculated (version C-1)

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CREDIZ VERIFICATION HARINGVLIJT
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sensors WR3, WR4, E-75

get
gec
gez
akk.

W 488

FIG. 130
version C-1

ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIET W0488
COMPARISON CREDIZ AND 1-D PROGRAMMES
DELFT HYDRAULICS LABORATORY

RUN HV18A-17  DELTAX=50
ALFA=2.0, GAMMA=0.8, T=7
ENERGY DECAY AND SET-UP IN RANDOM WAVES
CREDIZ VERIFICATION HARINGVLIEKT W0488
COMPARISON CREDIZ AND 1-D PROGRAMMES
DELFT HYDRAULICS LABORATORY

RUN HV18B-20 DELTAX=50
ALFA=2.0 GAMMA=0.8 T=7 S

W 488 FIG. 132