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LAMPIRAN

Lampiran 1. Penjabaran persamaan (4.2) ke persamaan (4.3)

$$h_1\left(\frac{\partial\eta_1(x,t)}{\partial x}\right)=h_2\left(\frac{\partial\eta_2(x,t)}{\partial x}\right) \quad (4.2)$$

$$h_1\left(-k_1A_ie^{-i(k_1x-\omega t)}+k_1A_{R1}e^{i(k_1x+\omega t)}\right)=h_2\left(-k_2A_{T1}e^{-i(k_1x-\omega t)}\right)$$

$$h_1\left(-k_1+k_1K_{R1}\right)=h_2\left(-k_2K_{T1}\right)$$

$$-h_1k_1+h_1k_1K_{R1}=-h_2k_2K_{T1}$$

$$h_1k_1\left(1-K_{R1}\right)=h_2k_2K_{T1} \quad (4.3)$$

Lampiran 2. Penjabaran persamaan (4.12) ke persamaan (4.13)

$$h_2\left(\frac{\partial\eta_2(x,t)}{\partial x}\right)=h_3\left(\frac{\partial\eta_3(x,t)}{\partial x}\right) \quad (4.12)$$

$$h_2\left(-k_2A_{T1}e^{-i(k_2x-\omega t)}+k_2A_{R2}e^{i(k_2x+\omega t)}\right)=h_3\left(-k_3A_{T2}e^{-i(k_3x-\omega t)}\right)$$

$$h_2\left(-k_2A_{T1}e^{-ik_2l)}+k_2A_{R2}e^{ik_2l}\right)=h_3\left(-k_3A_{T2}e^{-k_3l}\right)$$

$$-h_2k_2K_{T1}e^{-ik_2l}+h_2k_2K_{R2}e^{ik_2l}=-h_3k_3K_{T2}e^{-k_3l}$$

$$h_2k_2K_{T1}e^{-ik_2l}-h_2k_2K_{R2}e^{ik_2l}=h_3k_3K_{T2}e^{-ik_3l}$$

Untuk gelombang monokromatik, angka gelombangnya tetap sedangkan kedalaman area 3 samadengan kedalaman area 1 (h_3=h_1).

$$K_{T1}e^{-ik_3l}-K_{R2}e^{ik_3l}=\frac{1}{q^2}K_{T2}e^{-ik_3l} \quad (4.13)$$

Lampiran 3. Penjabaran persamaan (4.14) ke persamaan (4.15)

$$F_2=F_3 \quad (4.14)$$

$$\frac{1}{2}\rho gA_{T1}^2e^{-2ik_3l}c_2-\frac{1}{2}\rho gA_{R2}^2e^{2ik_3l}c_2=\frac{1}{2}\rho gA_{T1}^2e^{-2ik_3l}c_3$$

Membagi kedua ruas dengan amplitude gelombang datang, maka

$$c_2K_{T1}^2e^{-2ik_3l}-c_2K_{R2}^2e^{2ik_3l}=c_2K_{T2}^2e^{-2ik_3l}$$

Kecepatan fasa pada laut dangkal adalah akar dari percepatan gravitasi dan kedalaman $c = \sqrt{gh}$, maka persamaan menjadi

$$\sqrt{h_2} K_{T1}^2 e^{-2ik_3 l} - \sqrt{h_2} K_{R2}^2 e^{2ik_3 l} = \sqrt{h_3} K_{T2}^2 e^{-2ik_3 l}$$

$$\sqrt{h_2} (K_{T1}^2 e^{-2ik_3 l} - K_{R2}^2 e^{2ik_3 l}) = \sqrt{h_3} K_{T2}^2 e^{-2ik_3 l}$$

$$K_{T1}^2 e^{-2ik_3 l} - K_{R2}^2 e^{2ik_3 l} = \sqrt{\frac{h_3}{h_2}} K_{T2}^2 e^{-2ik_3 l}$$

$\frac{1}{q^2} = \frac{h_1}{h_2}$, maka $\sqrt{\frac{h_1}{h_2}} = \sqrt{\frac{1}{q^2}}$. Persamaan ditulis menjadi

$$K_{T1}^2 e^{-2ik_3 l} - K_{R2}^2 e^{2ik_3 l} = \sqrt{\frac{1}{q^2}} K_{T2}^2 e^{-2ik_3 l} \qquad (4.15)$$

Lampiran 4. Penjabaran persamaan (4.15) ke persamaan (4.16)

Persamaan (4.15) di uraikan,

$$(K_{T1} e^{-ik_3 l})^2 - (K_{R2} e^{ik_3 l})^2 = \sqrt{\frac{1}{q^2}} (K_{T2} e^{-ik_3 l})^2$$

$$(K_{T1} e^{-ik_3 l} + K_{R2} e^{ik_3 l})(K_{T1} e^{-ik_3 l} - K_{R2} e^{ik_3 l}) = \sqrt{\frac{1}{q^2}} (K_{T2} e^{-ik_3 l})^2$$

Dengan mensubstitusi persamaan (4.13), maka diperoleh

$$(K_{T1} e^{-ik_3 l} + K_{R2} e^{ik_3 l}) \frac{1}{q^2} K_{T2} e^{-ik_3 l} = \sqrt{\frac{1}{q^2}} (K_{T2} e^{-ik_3 l})^2$$

$$K_{T1} e^{-ik_3 l} + K_{R2} e^{ik_3 l} = q^2 \sqrt{\frac{1}{q^2}} K_{T2} e^{-ik_3 l}$$

Metode substitusi/eliminasi untuk persamaan yang diperoleh dengan persamaan (4.3) sehingga,

$$2K_{T1}e^{-ik_3l} = \left(\frac{1}{q^2} + q^2\sqrt{\frac{1}{q^2}}\right)K_{T2}e^{-ik_3l}$$

$$2K_{T1} = \left(\frac{1}{q^2} + q^2\sqrt{\frac{1}{q^2}}\right)K_{T2}$$

Subtitusi nilai K_{T1}

$$\frac{4q}{\left(1+q^3\right)} = \left(\frac{1}{q^2} + q^2\sqrt{\frac{1}{q^2}}\right)K_{T2}$$

Maka koefisien transmisi K_{T2} diperoleh sebagai berikut.

$$K_{T2} = \frac{4q^3}{\left(1+q^3\right)\left(1+q^4\sqrt{\frac{1}{q^2}}\right)} \qquad (4.16)$$

Lampiran 5. Data Batimetri

1. Data batimetri h_2/h_1=0.3

lebar 3 m	lebar 5 m	lebar 7 m
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.072
0.36	0.072	0.072
0.072	0.072	0.072
0.072	0.072	0.072
0.072	0.072	0.072
0.072	0.072	0.072
0.36	0.072	0.072
0.36	0.36	0.072
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36

Lampiran 6. Data Batimetri

2. Data batimetri h_2/h_1=0.4

lebar 3 m	lebar 5 m	lebar 7 m
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.108
0.36	0.108	0.108
0.108	0.108	0.108
0.108	0.108	0.108
0.108	0.108	0.108
0.108	0.108	0.108
0.36	0.108	0.108
0.36	0.36	0.108
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36

Lampiran 7. Data Batimetri

3. Data batimetri h_2/h_1=0.5

lebar 3 m	lebar 5 m	lebar 7 m
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.144
0.36	0.144	0.144
0.144	0.144	0.144
0.144	0.144	0.144
0.144	0.144	0.144
0.144	0.144	0.144
0.36	0.144	0.144
0.36	0.36	0.144
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36
0.36	0.36	0.36

Lampiran 8. Script Model Input SWASH

```
$************HEADING*********************************
$
PROJ 'L12bbb01' 'L12'       $nama Project
$
$  MODIFIKASI KASUS 6. LENGKAPI DGN SPONGE LAYER
$
$ --|----------------------------------------------------------|--
$   | This SWASH input file is part of the bench mark tests for    |
$   | SWASH. More information about this test can be found in      |
$   | an accompanied document.                                     |
$ --|----------------------------------------------------------|--
$
$***********MODEL INPUT*********************************
$
MODE DYN ONED           $Dinensi Model (1D)
$
CGRID 0. 0. 0. 30. 0. 1200 0    $Dimensi Grid Komputer
[xpc][ypc][alpc][xlenc][ylenc][mxc][myc]
$
VERT 1               $Skema grid vertical (lapisan vertikal)
$
INPGRID BOTTOM 0. 0. 0. 30 0 1. 1.  $inputgrid bottom level
[xpinp][ypinp][alpinp][mxinp][myinp][dxinp][dyinp]
READINP BOTTOM 1. 'D1.bot' 1 1 FREE $bidang input batimetri [fac] data
batimetri [idla][nhedf]
$
INIT zero            $initial water level dan komponen kecepatan di
setting nol
$
BOU SIDE W CCW BTYPE VEL  SMOO 1.0 SEC CON FOUR 2.7 0.025 6.28 90.
$input data T,Zero, Hi,Omega, Fase
BOU SIDE E CCW BTYPE SOMMERFELD
SPON EAST 5.   $panjang sponge layer 5 m di timur
$
FRIC CONSTANT 0.     $Gesekan Nol
VISC 0.         $Viskositas nol
NONHYDrostatic       $kasus nonhidrostatik
$
DISCRET UPW  FROMM  $UPWind(tipe diskretisasi utk pers. momentum),
Fromm's scheme {kappa=0}
DISCRET UPW   UMOM V NONE   $UMOM(diskretisasi utk Pers. MOmentum u/v)
DISCRET CORR FIRST  $NONE(no upwinding), CORR(tipe diskretisasi utk
kedalaman)
$            $FIRSTORDER=indicates that the standard first order upwind
scheme is used
$************ OUTPUT REQUESTS *************************     $keluaran
yang di inginkan
$
POINTS 'A111'  1.0   0.
POINTS 'A112' 13.0   0.
POINTS 'A113' 16.0   0.
POINTS 'A114' 17.0   0
POINTS 'A115' 18.0   0.
POINTS 'A116' 19.0   0.     $penempatan letak PROBE
POINTS 'A117' 20.0   0.
POINTS 'A118' 21.0   0.
```

```
POINTS 'A119' 22.0   0.
POINTS 'A110' 28.0   0.
$
QUANTITY HSIG 'Hs' 'Significant wave height' DUR 90 MIN
QUANTITY HRMS 'Hrms' 'root mean squared wave height' DUR 90 MIN
QUANTITY SETUP 'St' 'Wave Set-up' DUR 90 MIN        %Data-data yang
diinginkan berdurasi 90 mnit
QUANTITY WATLEV 'WL' 'Water Level' DUR 90 MIN
QUANTITY BOTLEV 'BL' 'Bottom Level'
QUANTITY XP 'Xp' 'X distance' HEXP 1000
$
TABLE  'A111' NOHEAD 'A111.tbl' TSEC WATL OUTPUT 000000.000 0.01 SEC
TABLE  'A112' NOHEAD 'A112.tbl' TSEC WATL OUTPUT 000000.000 0.01 SEC
TABLE  'A113' NOHEAD 'A113.tbl' TSEC WATL OUTPUT 000000.000 0.01 SEC
TABLE  'A114' NOHEAD 'A114.tbl' TSEC WATL OUTPUT 000000.000 0.01 SEC
TABLE  'A115' NOHEAD 'A115.tbl' TSEC WATL OUTPUT 000000.000 0.01 SEC
TABLE  'A116' NOHEAD 'A116.tbl' TSEC WATL OUTPUT 000000.000 0.01 SEC
$spasi 0.01 detik untuk setiap probe
TABLE  'A117' NOHEAD 'A117.tbl' TSEC WATL OUTPUT 000000.000 0.01 SEC
TABLE  'A118' NOHEAD 'A118.tbl' TSEC WATL OUTPUT 000000.000 0.01 SEC
TABLE  'A119' NOHEAD 'A119.tbl' TSEC WATL OUTPUT 000000.000 0.01 SEC
TABLE  'A110' NOHEAD 'A110.tbl' TSEC WATL OUTPUT 000000.000 0.01 SEC
$$
FRAME 'PT' 0. 0. 0. 30. 0. 1000 0    $grid frame model
[xpfr][ypfr][alpfr][xlenfr][ylenfr][mxfr][myfr]
TABLE 'PT' HEAD 'S11.tab' XP HSIG HRMS SETUP BOTLEV WATLEV  $menamakan
keluaran dan jenisnya
$
TEST 1,0
COMPUTE 000000.000 0.1 SEC 000080.000       $waktu komputasi sebanyak 80
spasi 0.1 detik
STOP                        $hentikan komputasi
```

Lampiran 9. Script menghitung dan plot koefisien transmisi

```
%Language    : Matlab R2017a;
%Authors     : Mutmainnah Abu;
%Affiliation: physics Study Program, Departement of physics,
%Hasanuddin Univ;
%% load data water level
clear all
load S11.tab;
load S12.tab;
load S13.tab;
load S21.tab;
load S22.tab;
load S23.tab;
load S31.tab;
load S32.tab;
load S33.tab;
load S41.tab;
load S42.tab;
load S43.tab;
load S51.tab;
load S52.tab;
load S53.tab;
load S61.tab;
load S62.tab;
load S63.tab;
```

```
load S71.tab;
load S72.tab;
load S73.tab;
load S81.tab;
load S82.tab;
load S83.tab;
load S91.tab;
load S92.tab;
load S93.tab;
load S101.tab;
load S102.tab;
load S103.tab;
load S111.tab;
load S112.tab;
load S113.tab;
%% parameter input
H1=0.05;
H2=0.06;
H3=0.07; %tinggi gelombang datang
L1=1.88;
L2=2.07;   %panjang gelombang
L3=2.26;
L4=2.44;
L5=2.63;
L6=2.82;
L7=3.01;
L8=3.19;
L9=3.38;
L10=3.57;
L11=3.76;
%% menghitung tinggi gelombang transmisi
X1 = S11(501:834,:);
Ht1 = max(X1(:,6))-min(X1(:,6));
X2 = S12(501:834,:);
Ht2 = max(X2(:,6))-min(X2(:,6));
X3 = S13(501:834,:);
Ht3 = max(X3(:,6))-min(X3(:,6));
X4 = S21(501:834,:);
Ht4 = max(X4(:,6))-min(X4(:,6));
X5 = S22(501:834,:);
Ht5 = max(X5(:,6))-min(X5(:,6));
X6 = S23(501:834,:);
Ht6 = max(X6(:,6))-min(X6(:,6));
X7 = S31(501:834,:);
Ht7 = max(X7(:,6))-min(X7(:,6));
X8 = S32(501:834,:);
Ht8 = max(X8(:,6))-min(X8(:,6));
X9 = S33(501:834,:);
Ht9 = max(X9(:,6))-min(X9(:,6));
X10 = S41(501:834,:);
Ht10 = max(X10(:,6))-min(X10(:,6));
X11 = S42(501:834,:);
Ht11 = max(X11(:,6))-min(X11(:,6));
X12 = S43(501:834,:);
Ht12 = max(X12(:,6))-min(X12(:,6));
X13 = S51(501:834,:);
Ht13 = max(X13(:,6))-min(X13(:,6));
X14 = S52(501:834,:);
Ht14 = max(X14(:,6))-min(X14(:,6));
X15 = S53(501:834,:);
Ht15 = max(X15(:,6))-min(X15(:,6));
```

```
X16 = S61(501:834,:);
Ht16 = max(X16(:,6))-min(X16(:,6));
X17 = S62(501:834,:);
Ht17 = max(X17(:,6))-min(X17(:,6));
X18 = S63(501:834,:);
Ht18 = max(X18(:,6))-min(X18(:,6));
X19 = S71(501:834,:);
Ht19 = max(X19(:,6))-min(X19(:,6));
X20 = S72(501:834,:);
Ht20 = max(X20(:,6))-min(X20(:,6));
X21 = S73(501:834,:);
Ht21 = max(X21(:,6))-min(X21(:,6));
X22 = S81(501:834,:);
Ht22 = max(X22(:,6))-min(X22(:,6));
X23 = S82(501:834,:);
Ht23 = max(X23(:,6))-min(X23(:,6));
X24 = S83(501:834,:);
Ht24 = max(X24(:,6))-min(X24(:,6));
X25 = S91(501:834,:);
Ht25 = max(X25(:,6))-min(X25(:,6));
X26 = S92(501:834,:);
Ht26 = max(X26(:,6))-min(X26(:,6));
X27 = S93(501:834,:);
Ht27 = max(X27(:,6))-min(X27(:,6));
X28 = S101(501:834,:);
Ht28 = max(X28(:,6))-min(X28(:,6));
X29 = S102(501:834,:);
Ht29 = max(X29(:,6))-min(X29(:,6));
X30 = S103(501:834,:);
Ht30 = max(X30(:,6))-min(X30(:,6));
X31 = S111(501:834,:);
Ht31 = max(X31(:,6))-min(X31(:,6));
X32 = S112(501:834,:);
Ht32 = max(X32(:,6))-min(X32(:,6));
X33 = S113(501:834,:);
Ht33 = max(X33(:,6))-min(X33(:,6));
%% menghitung koefisien transmisi
Kt1=Ht1/H1;
Kt2=Ht2/H2;
Kt3=Ht3/H3;
Kt4=Ht4/H1;
Kt5=Ht5/H2;
Kt6=Ht6/H3;
Kt7=Ht7/H1;
Kt8=Ht8/H2;
Kt9=Ht9/H3;
Kt10=Ht10/H1;
Kt11=Ht11/H2;
Kt12=Ht12/H3;
Kt13=Ht13/H1;
Kt14=Ht14/H2;
Kt15=Ht15/H3;
Kt16=Ht16/H1;
Kt17=Ht17/H2;
Kt18=Ht18/H3;
Kt19=Ht19/H1;
Kt20=Ht20/H2;
Kt21=Ht21/H3;
Kt22=Ht22/H1;
Kt23=Ht23/H2;
```

```
Kt24=Ht24/H3;
Kt25=Ht25/H1;
Kt26=Ht26/H2;
Kt27=Ht27/H3;
Kt28=Ht28/H1;
Kt29=Ht29/H2;
Kt30=Ht30/H3;
Kt31=Ht31/H1;
Kt32=Ht32/H2;
Kt33=Ht33/H3;
%% plot koefisien transmisi tiap tinggi undakan
T1=[Ht1 Ht2 Ht3 Ht4 Ht5 Ht6 Ht7 Ht8 Ht9 Ht10 Ht11 Ht12 Ht13 Ht14 Ht15
Ht16 Ht17 Ht18 Ht19 Ht20 Ht21 Ht22 Ht23 Ht24 Ht25 Ht26 Ht27 Ht28 Ht29
Ht30 Ht31 Ht32 Ht33]';
q2=[Kt1 Kt2 Kt3 Kt4 Kt5 Kt6 Kt7 Kt8 Kt9 Kt10 Kt11 Kt12 Kt13 Kt14 Kt15
Kt16 Kt17 Kt18 Kt19 Kt20 Kt21 Kt22 Kt23 Kt24 Kt25 Kt26 Kt27 Kt28 Kt29
Kt30 Kt31 Kt32 Kt33]';
x2=[H1/L1 H2/L1 H3/L1 H1/L2 H2/L2 H3/L2 H1/L3 H2/L3 H3/L3 H1/L4 H2/L4
H3/L4 H1/L5 H2/L5 H3/L5 H1/L6 H2/L6 H3/L6 H1/L7 H2/L7 H3/L7 H1/L8 H2/L8
H3/L8 H1/L9 H2/L9 H3/L9 H1/L10 H2/L10 H3/L10 H1/L11 H2/L11 H3/L11]';
f1 = fit(x2,q2,'power1')
hold on
figure(1)
plot(f1,x2,q2)
ylabel('Ct');
xlabel('Hi/L');
hold off
%%end
```