Contents


```
clear all; close all; clc;
rng(13); % setting seed for random numbers
```

Initializing parameters

Somehow plausible parameter of wave amplitude is A * (patchSize / meshSize), where A is nothing but a scaling factor.

- For 'calm': $\frac{patchSize}{meshSize} \leq 0.5$
- For 'tsunami': $\frac{patchSize}{meshSize} \geq 3.0$

```
meshSize = 64; % field size
windDir = [0.1,1];
patchSize = 80;
A = 1e-7;
g = 9.81; % gravitational constant
windSpeed = 100;
timeStep = 1/25;
```

```
x1 = linspace(-10, 10, meshSize+1); x = x1(1:meshSize);
y1 = linspace(-10, 10, meshSize+1); y = y1(1:meshSize);
[X,Y] = meshgrid(x,y); % wave field
```

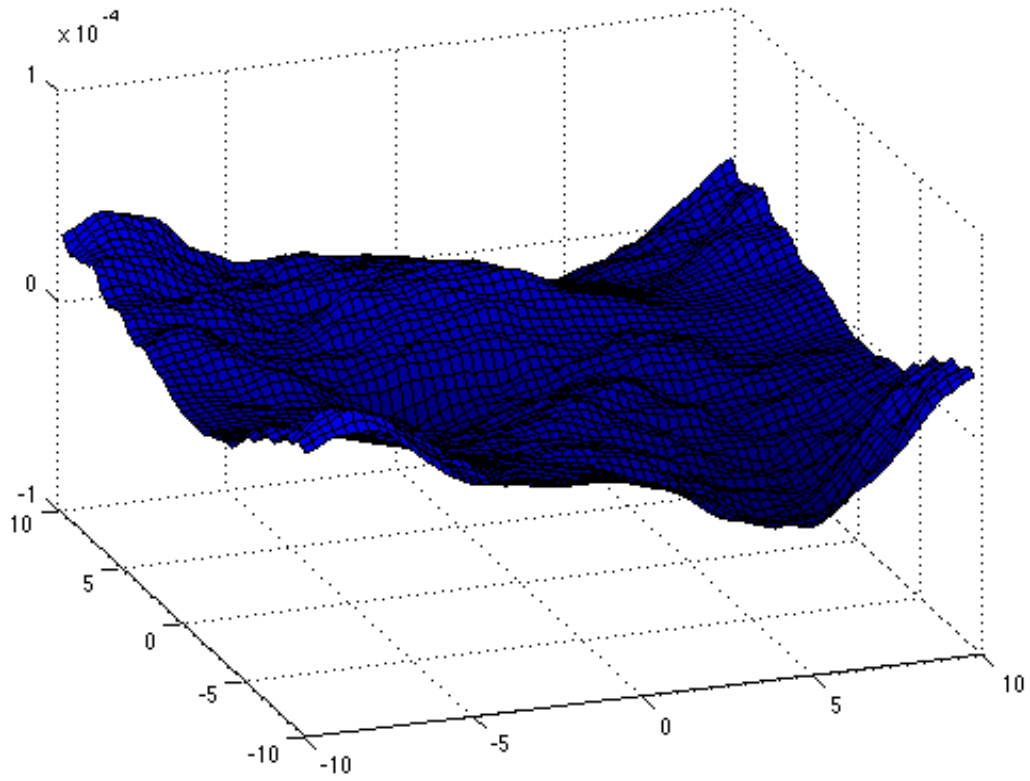
```
i = 1:meshSize; j = 1:meshSize; % indecies
[I,J] = meshgrid(i,j); % field of indecies
Kx = 2.0 * pi / patchSize * (-meshSize / 2.0 + I); % = 2*pi*n / Lx, -N/2 <= n < N/2
Ky = 2.0 * pi / patchSize * (-meshSize / 2.0 + J); % = 2*pi*m / Ly, -M/2 <= m < M/2
K = sqrt(Kx.^2 + Ky.^2); % ||K||
W = sqrt(K .* g); % deep water frequencies (empirical parameter)
```

```
P = zeros(size(X)); % % phillips spectrum
for i = 1:meshSize
    for j = 1:meshSize
        P(i,j) = phillips(Kx(i,j), Ky(i,j), windDir, windSpeed, A, g);
    end
end

% height field at time t = 0
H0 = 1/sqrt(2) .* (randn(size(X)) + 1i .* randn(size(X))) .* sqrt(P);
```

```
rotate3d on; view(-20,30);
for t = 1:1 % 10000 * timeStep (sec)
    Ht = H0 .* exp(1i .* W .* (t * timeStep)) + ...
         conj(flip(flip(H0,1),2)) .* exp(-1i .* W .* (t * timeStep));
```

```
    [az,el] = view;
    surf(X,Y,real(signCor(ifft2(Ht),meshSize))); %surf(X,Y,abs(real(ifft2(Ht))));
    axis([-10 10 -10 10 -1e-4 1e-4]); view(az,el);
    blue = linspace(0.4, 1.0, 25)'; map = [blue*0, blue*0, blue];
    %shading interp; % improve shading (remove "faceted" effect)
    colormap(map);
    pause(1/60);
end
```



Sources

- http://stackoverflow.com/questions/28279337/matlab-cuda-ocean-wave-simulation

---

Published with MATLAB® R2014a