平成 13 年度海岸工学者の集い

浅海域での砕波変形モデル

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à Wave breaking model (Model-2) by J. Veeramony and I.A. Svendsen(2000)

Ÿ Basic definitions

Ÿ a) Hydraulic jump model

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<< Graphics`Arrow`
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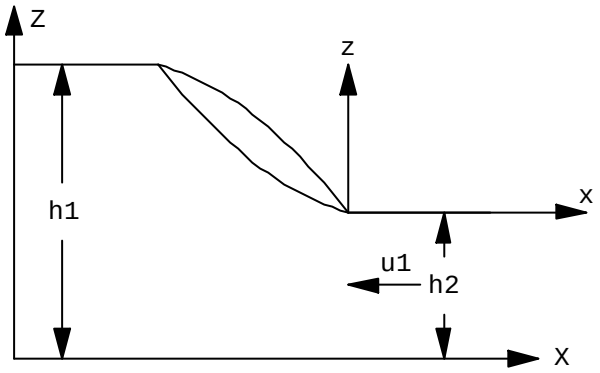


$$x = \frac{h_2}{h_1} = \frac{1}{2}\left(-1 + \sqrt{1 + 8 F_r^2}\right);$$

$$F_r = \frac{U_1}{\sqrt{g h_1}}; \quad l_r = 3 h_1; \quad q = \frac{x}{l_r};$$

$$n_t = 0.01 h_1 \sqrt{g h_1}; \quad k = \frac{n_t}{h_1^2} \frac{l_r}{\sqrt{g h_1}}$$

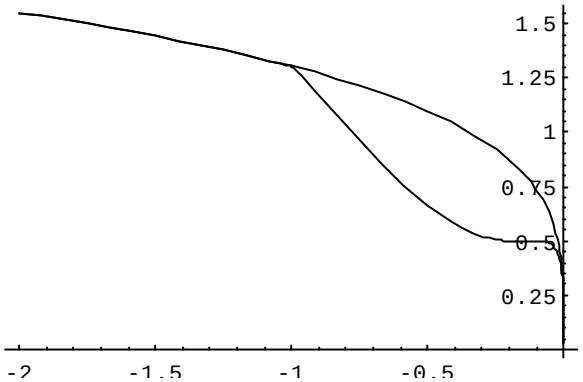
Ÿ b) Set variables

Ÿ c) ws, d, z and ze

Ÿ d) $\partial w_s / \partial t$ and G_n (ws seeing from moving frame with speed c)

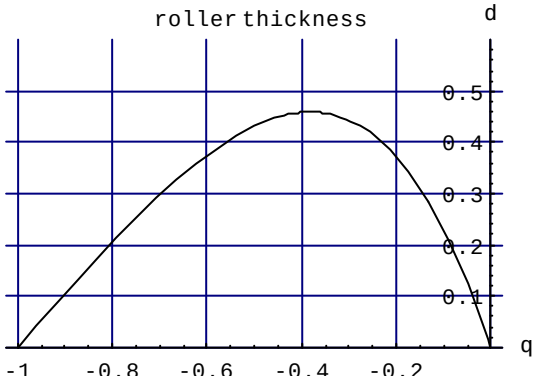
Ÿ e) Graphics

Plot@8z, ze<, 8q, -2, 0<D



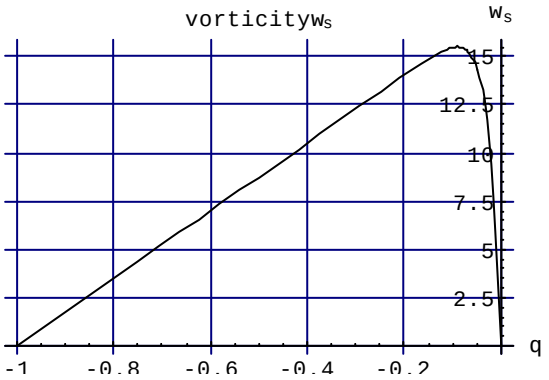
… Graphics …

Plot@d, 8q, -1, 0<, PlotRange ® 80, 0.6<, GridLines ® Automatic,
PlotLabel ® "roller thickness", AxesLabel ® 8"q", "d"<D



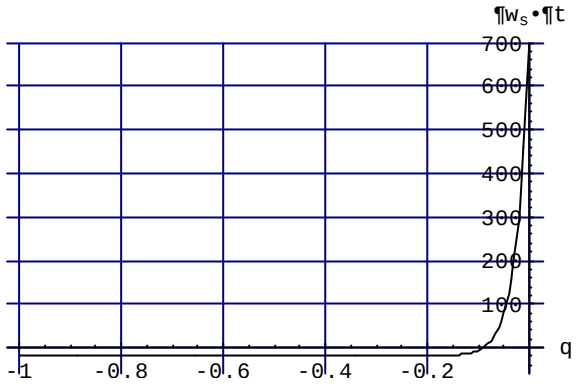
… Graphics …

Plot@ws, 8q, -1, 0<, PlotRange ® All, GridLines ® Automatic,
PlotLabel ® "vorticity w_s", AxesLabel ® 8"q", "w_s"<D



… Graphics …

```
Plot@wsd, 8q, -1, 0<, PlotRange ® 8700, -60<,
 GridLines ® Automatic, AxesLabel ® 8"q", "¶ws•¶t"<D
```



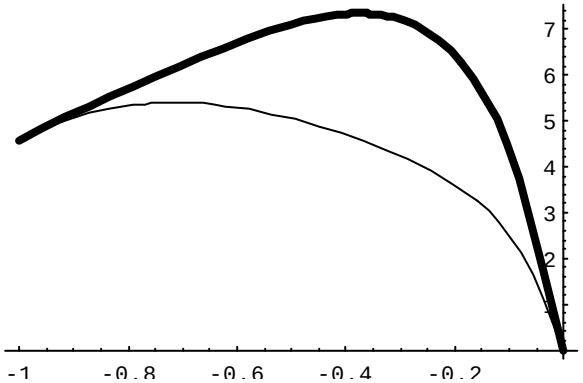
… Graphics …

Ÿ Vertical distribution of u_r

Ÿ a) Integration of vorticity and equation of u_r

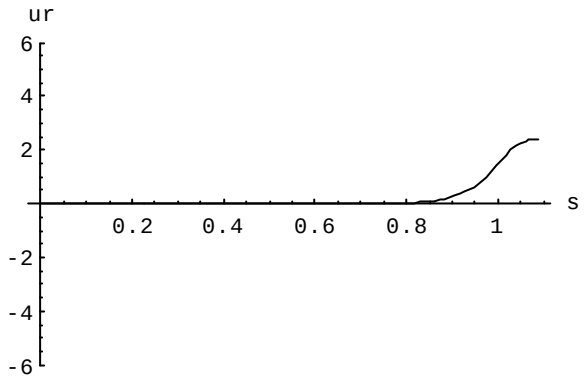
Ÿ b) Vertical distribution of u_r (Graphics)

```
Plot@8ur1@q, 1D, ur2@q, smaxD<, 8q, -1, 0<, PlotRange ® All,
 PlotStyle ® 88Thickness@0.005D<, 8Thickness@0.015D<<D
```



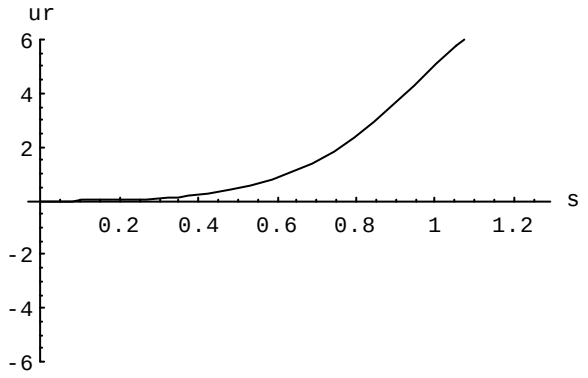
… Graphics …

```
q = -0.05; Plot@ur@q, sD, 8s, 0, smax<, PlotRange ® 8-6, 6<, AxesLabel ® 8"s", "ur"<D
```



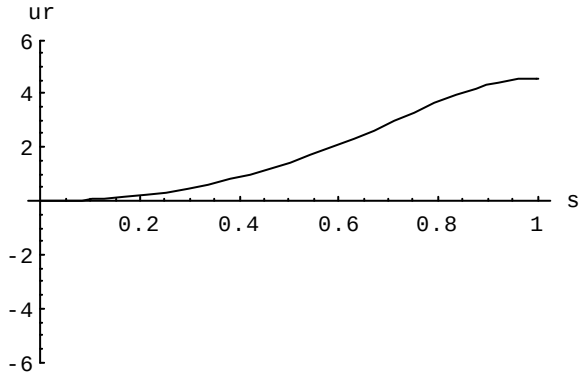
… Graphics …

```
q = -0.5; Plot@8ur@q, sD<, 8s, 0, smax<, PlotRange ® 8-6, 6<, AxesLabel ® 8"s", "ur"<D
```



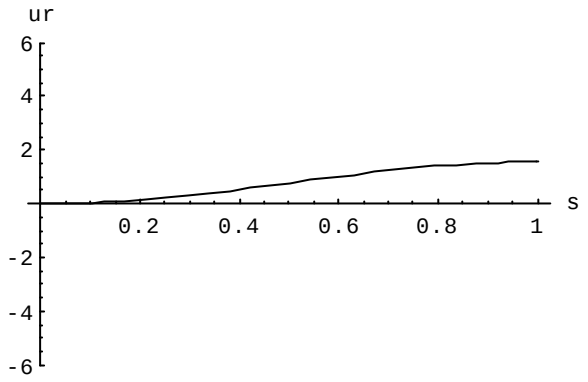
… Graphics …

```
q = -1; Plot@8ur@q, sD<, 8s, 0, smax<, PlotRange ® 8-6, 6<, AxesLabel ® 8"s", "ur"<D
```



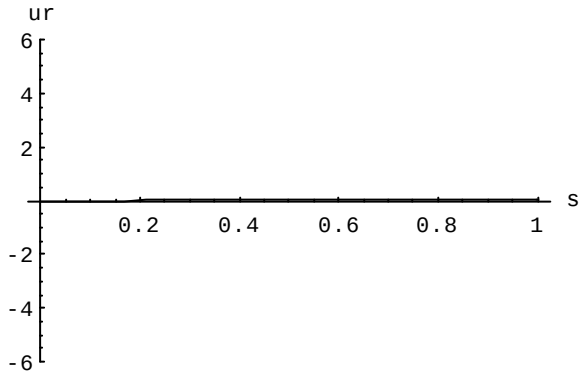
… Graphics …

```
q = -2; Plot@8ur@q, sD<, 8s, 0, smax<, PlotRange ® 8-6, 6<, AxesLabel ® 8"s", "ur"<D
```



… Graphics …

```
q = -5; Plot@8ur@q, sD<, 8s, 0, smax<, PlotRange ® 8-6, 6<, AxesLabel ® 8"s", "ur"<D
```



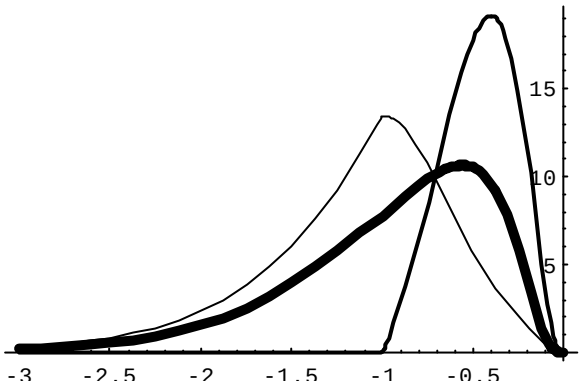
… Graphics …

ÿ Characteristics of breaking term,DM

ÿ a) Equation of DM (w is assumed a quadratic distribution between z and ze)

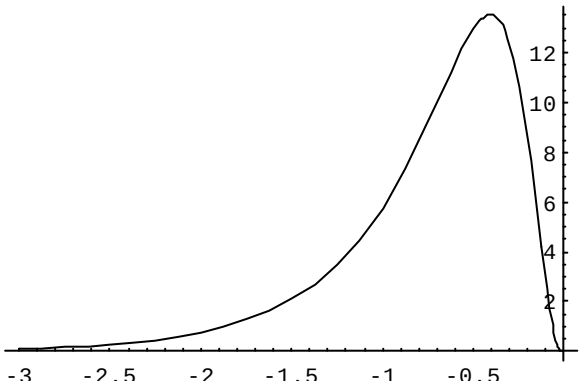
Ÿ b) Graphics

```
PlotA9DM1@qD, DM2@qD, HOr@qD + DOr@qDL^2 / Hh1 + zL=, 8q, -3, 0<,
 PlotStyle ® 8Thickness@0.005D, Thickness@0.01D, Thickness@0.02D<E
```



… Graphics …

```
Plot@DM@qD, 8q, -3, 0<D
```



… Graphics …