



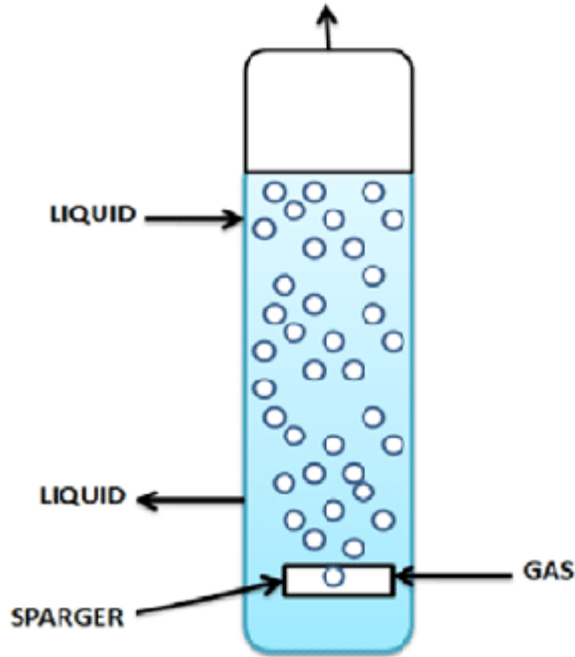
OPOLE UNIVERSITY
OF TECHNOLOGY



IMAGE RECONSTRUCTION METHOD FOR A DISCRETE OPTICAL TOMOGRAPH

Mariusz R. Rząsa

OPTICAL TOMOGRAPHY FOR MEASUREMENT OF BUBBLE PARAMETERS IN AERATION PROCESS



$$m = 2A(C_s - C_0) \sqrt{\frac{D \cdot t_e}{\pi}}$$

m - diffused oxygen mass, kg;

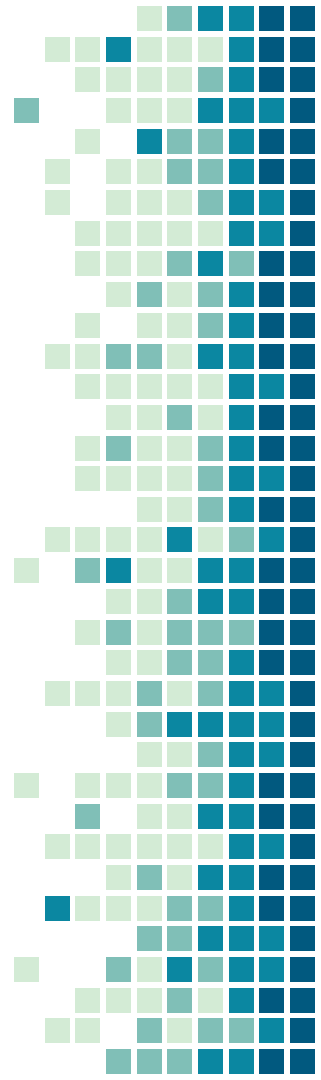
A – two-phase contact area, m^2 ;

C_s - oxygen concentration in a saturated liquid, kg/m^3 ;

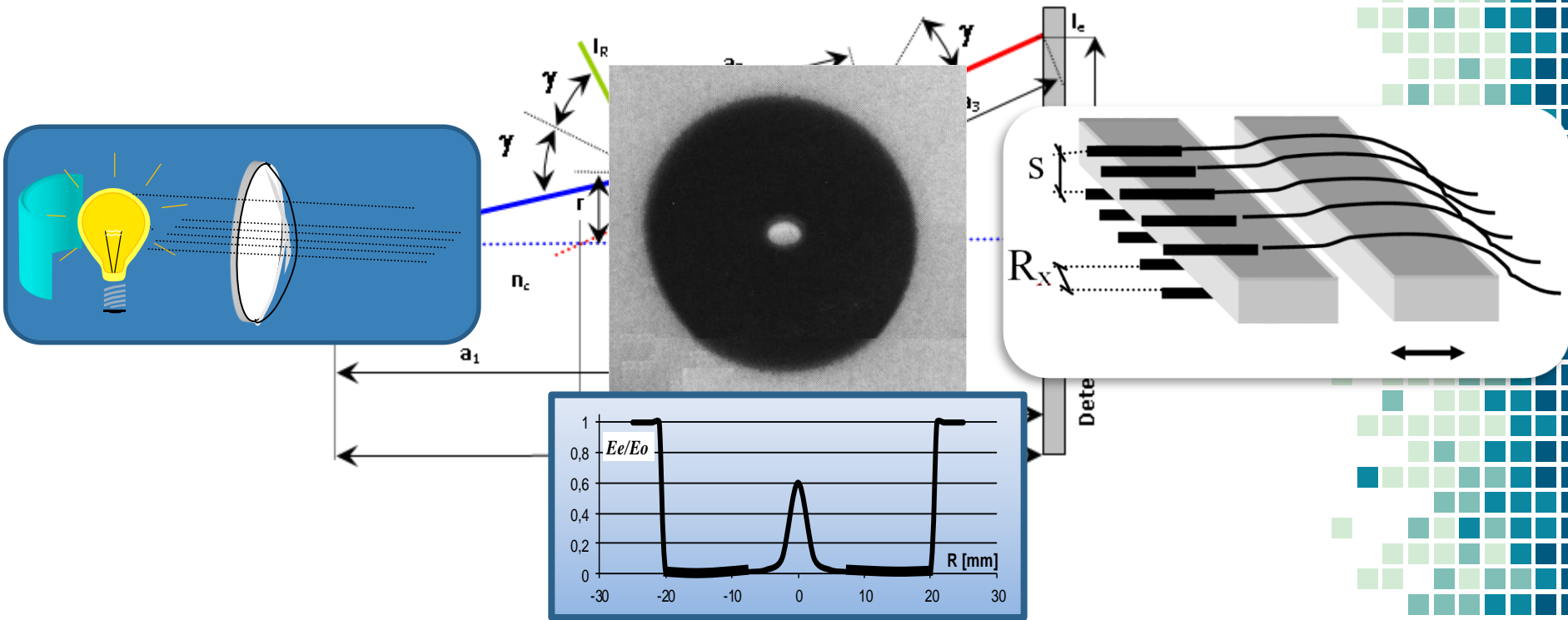
C_0 - initial oxygen concentration in the liquid, kg/m^3 ;

D - diffusion coefficient, m^2/s ;

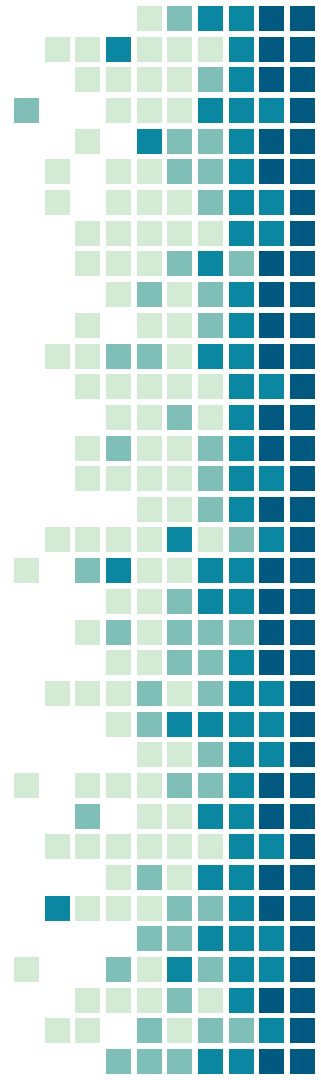
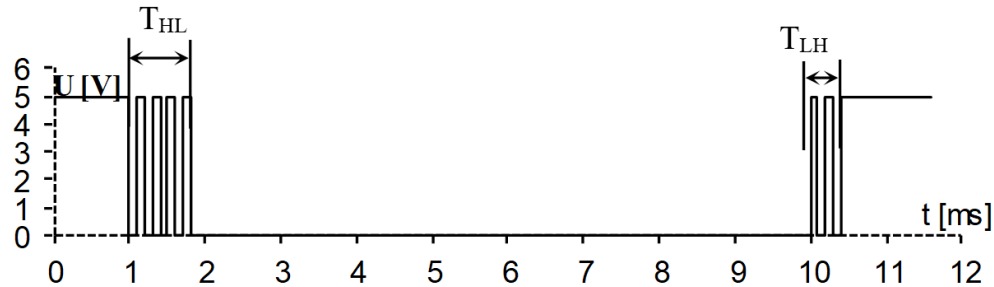
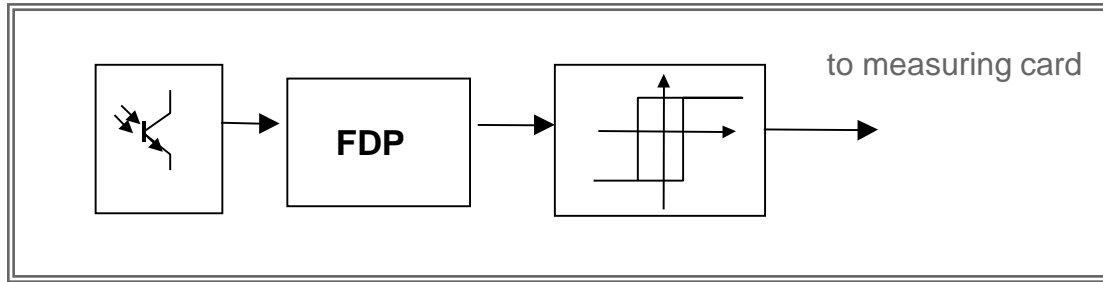
t_e - time of contact of liquid elements with the gas phase, s.



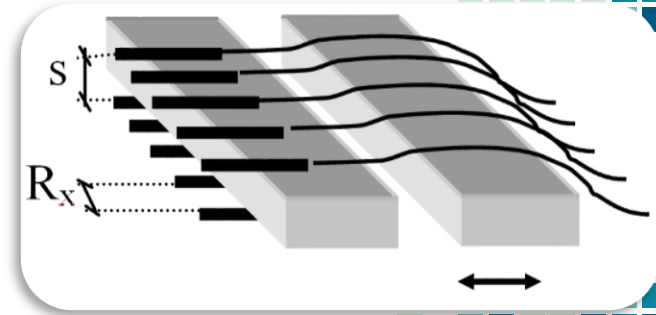
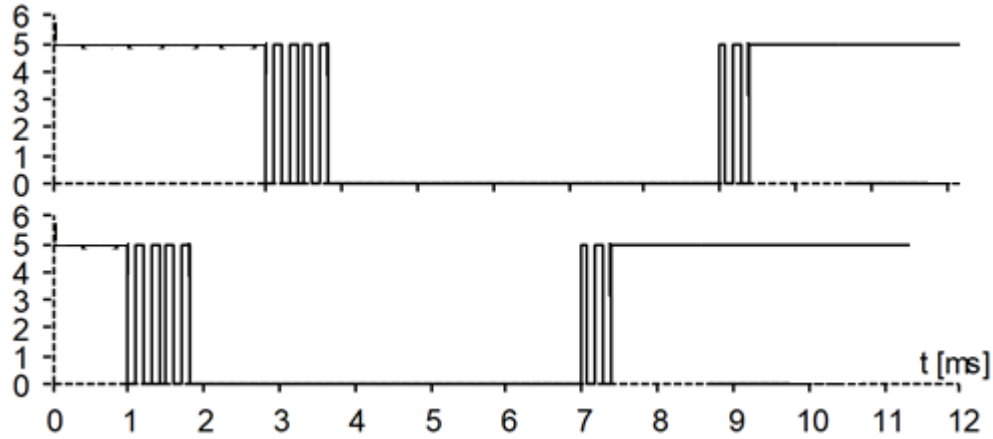
IDEA OF THE DISCRET OPTICAL TOMOGRAPH



ELECTRICAL SIGNAL



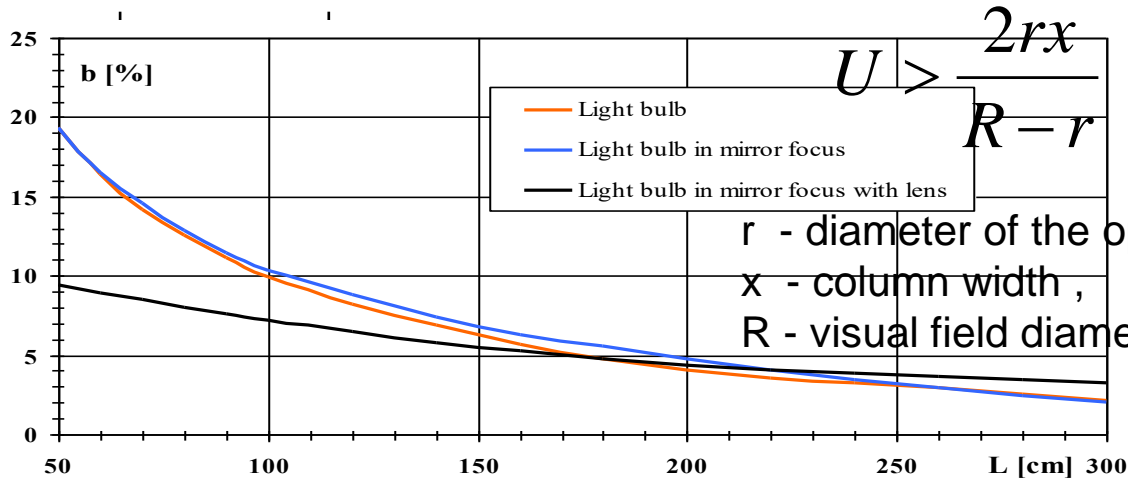
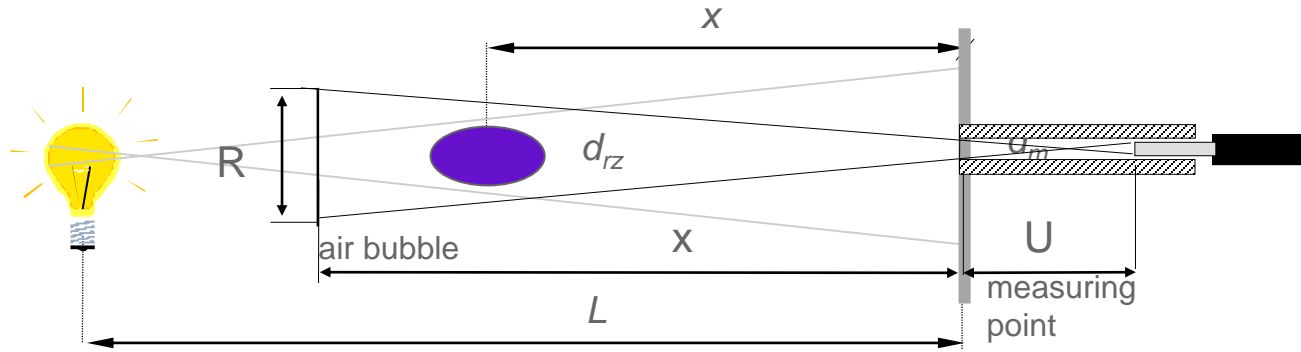
BUBBLE FLOW VELOCITY



$$w_{\infty} = \frac{s}{n \cdot t_p}$$

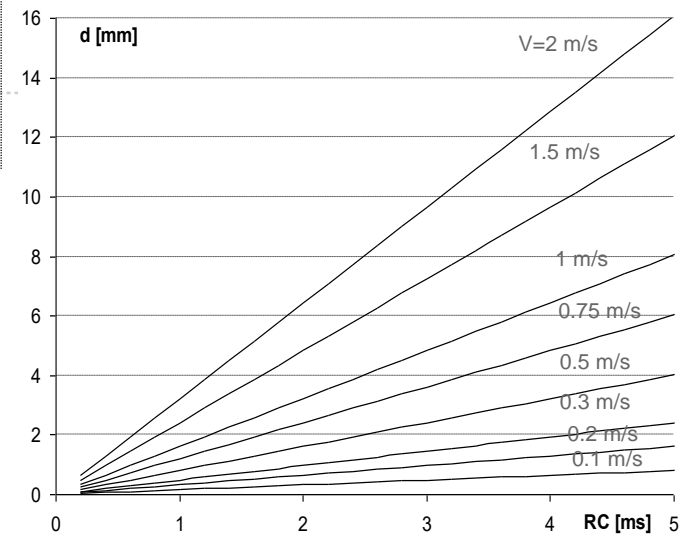
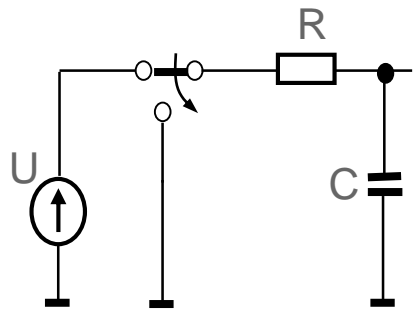
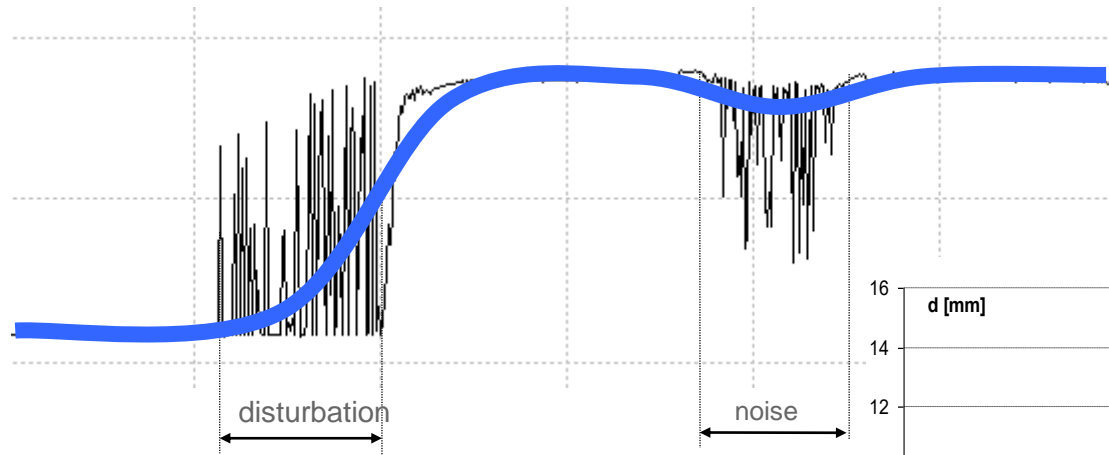
$$K_{\max_{n_p \rightarrow N_p}} = \sum_{i=0}^{N_p - n_p} k_i^1 k_{i+n_p}^2$$

ERROR OF VELOCITY CALCULATION

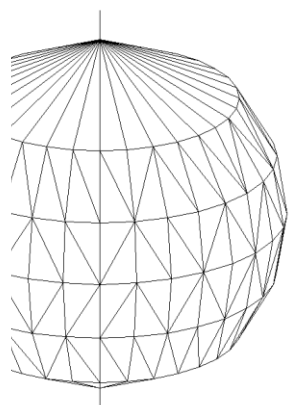
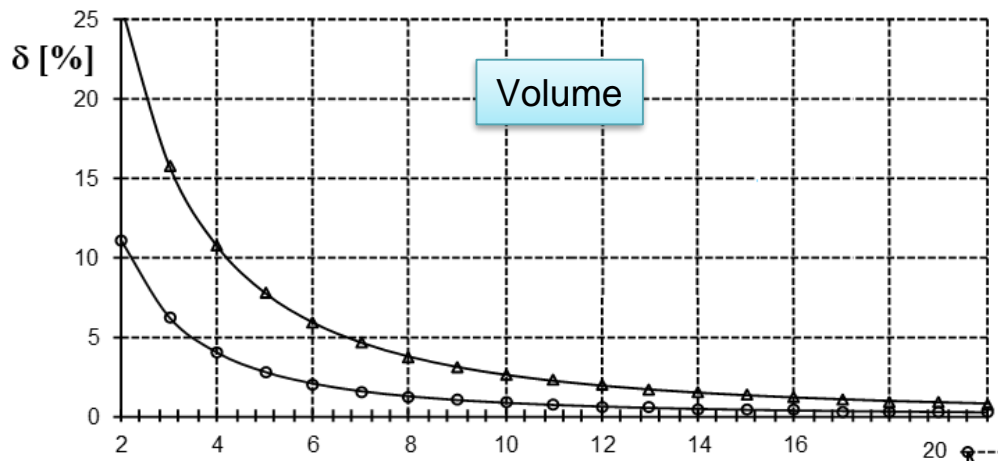
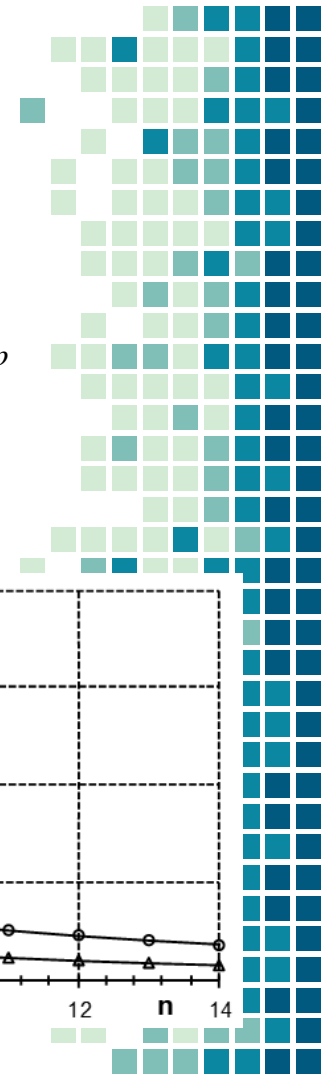


r - diameter of the optical-wave guide ,
 x - column width ,
 R - visual field diameter .

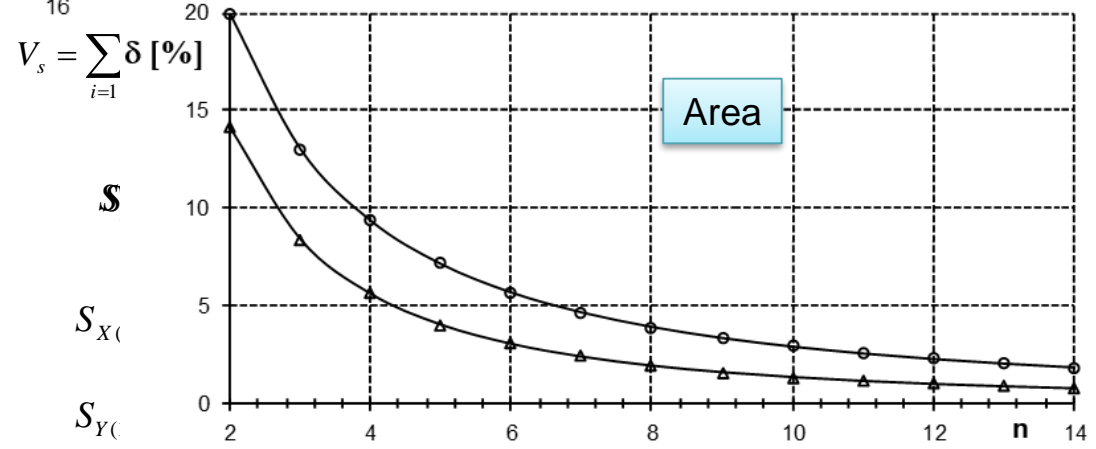
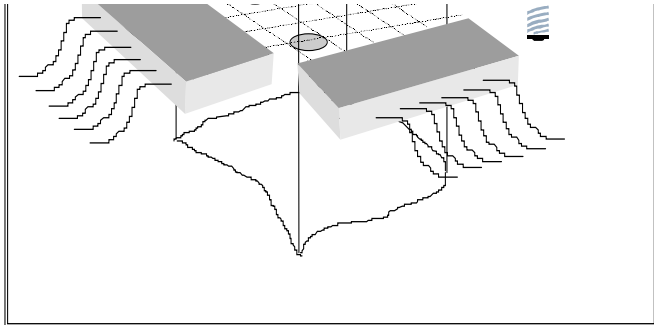
ERROR OF VELOCITY CALCULATION



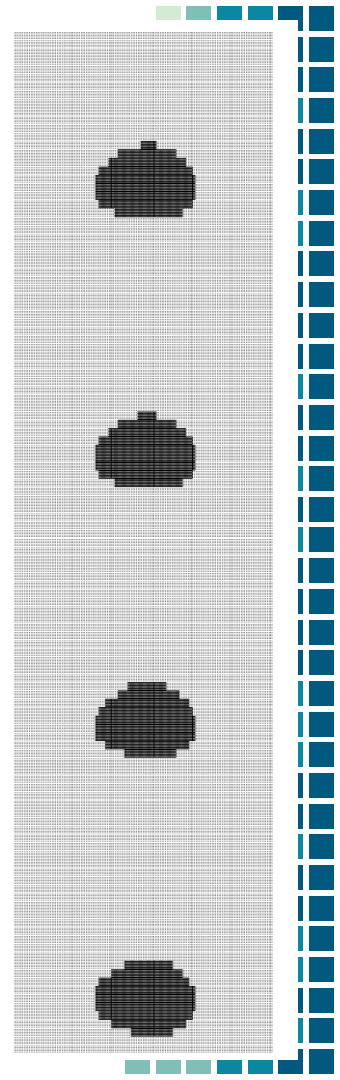
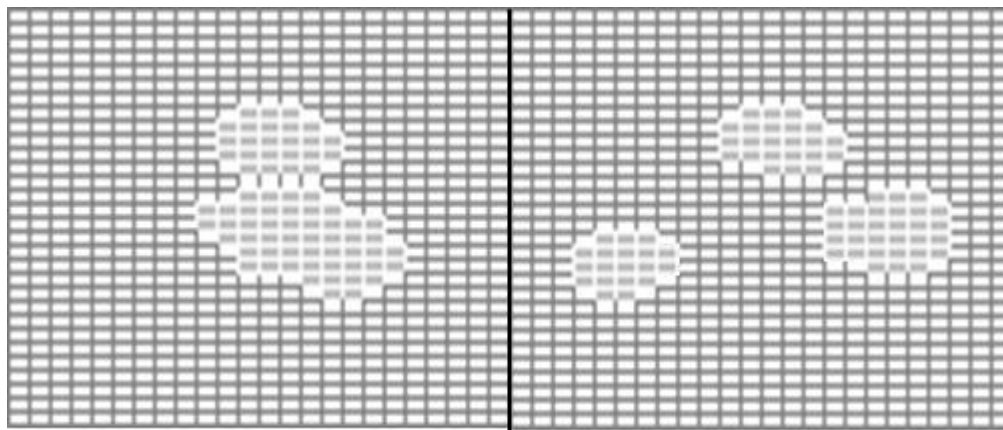
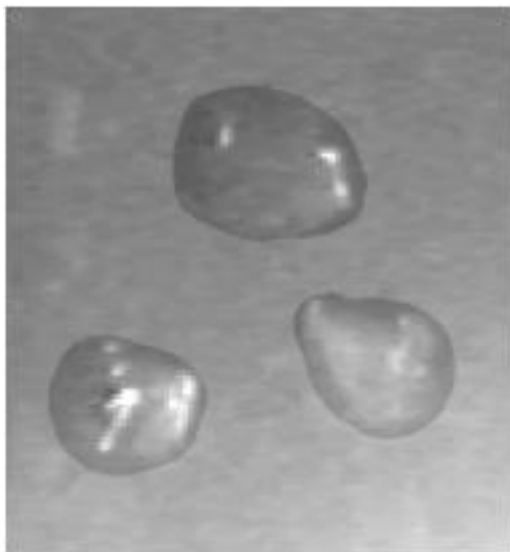
DISCRET OPTICAL TOMOGRAPH



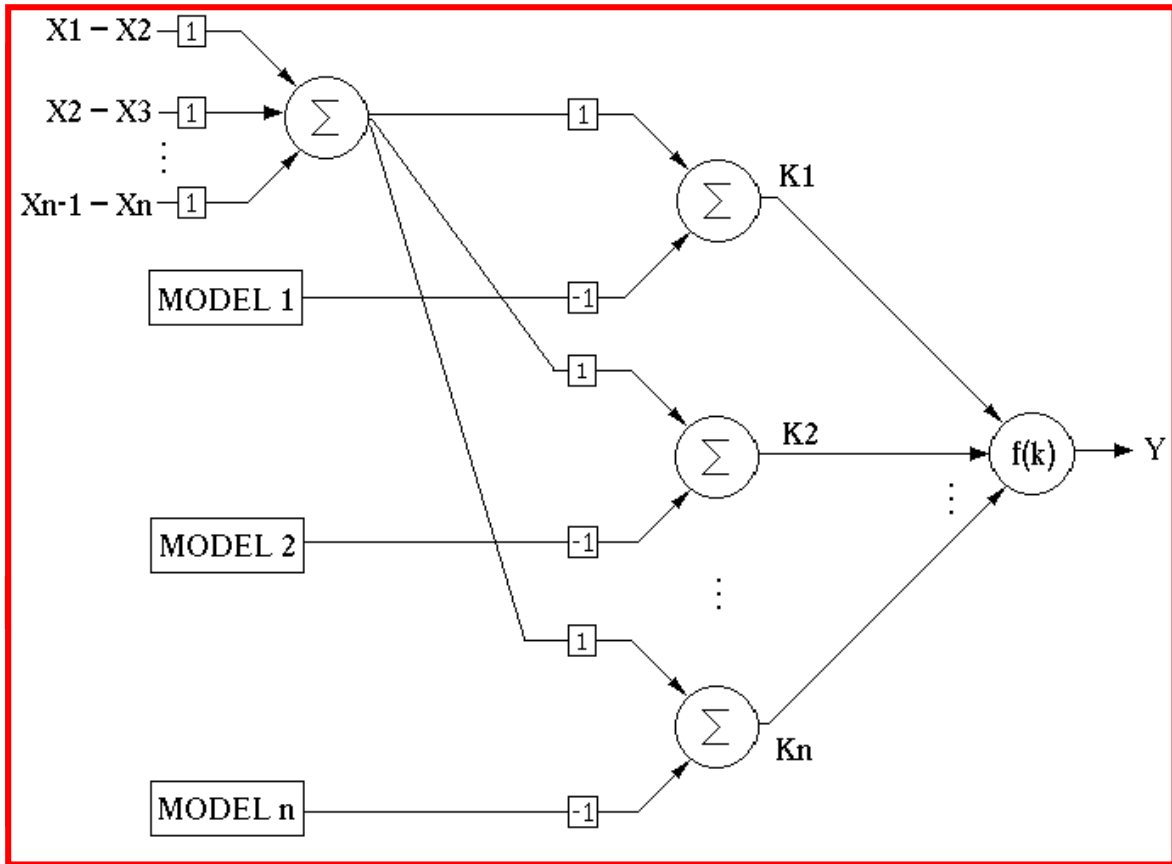
$$d_z = w_\infty \cdot t_p$$



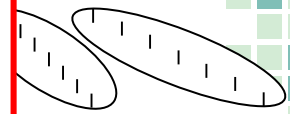
RECONSTRUCTION METHOD



RECONSTRUCTION METHOD



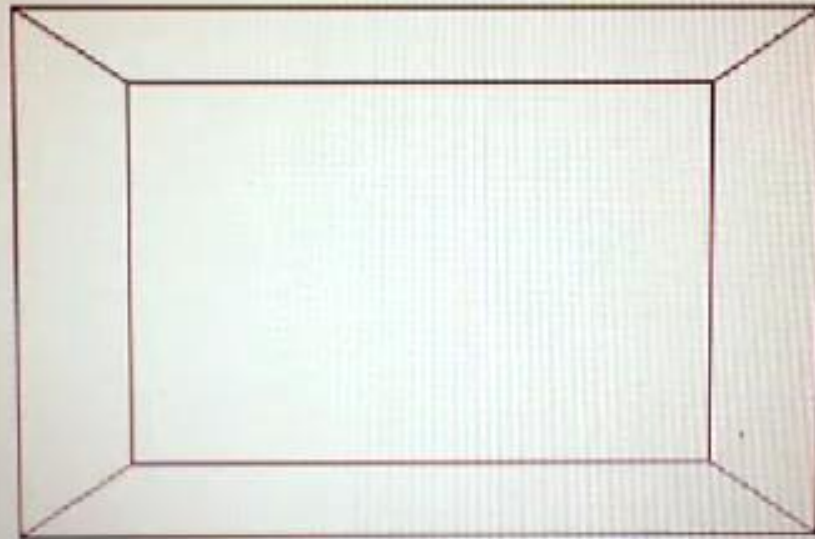
x_{i+1}
1



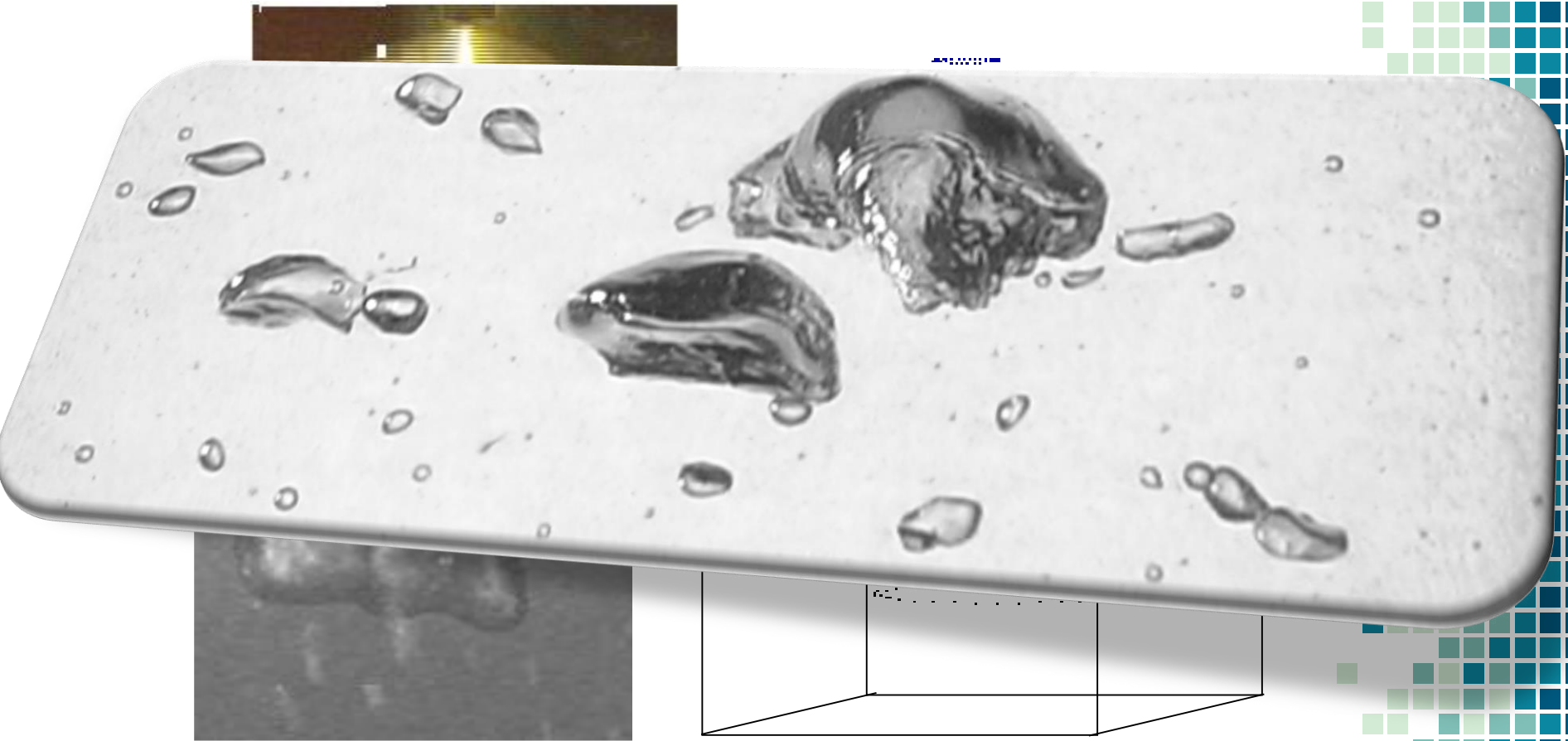
5 $W=1$ $W=2$



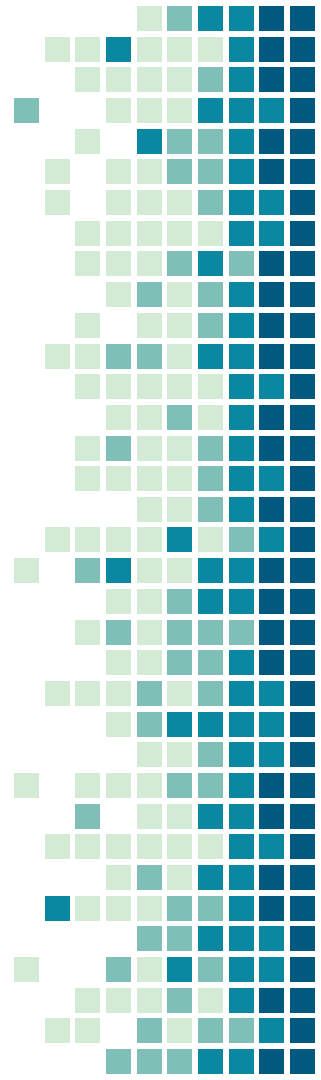
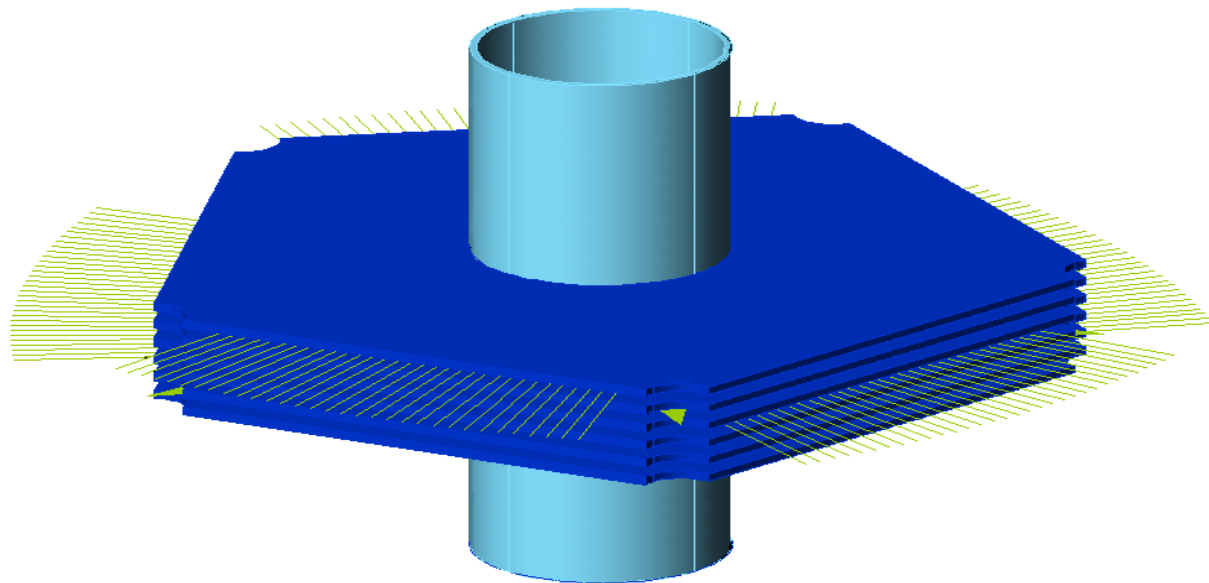
RECONSTRUCTION METHOD



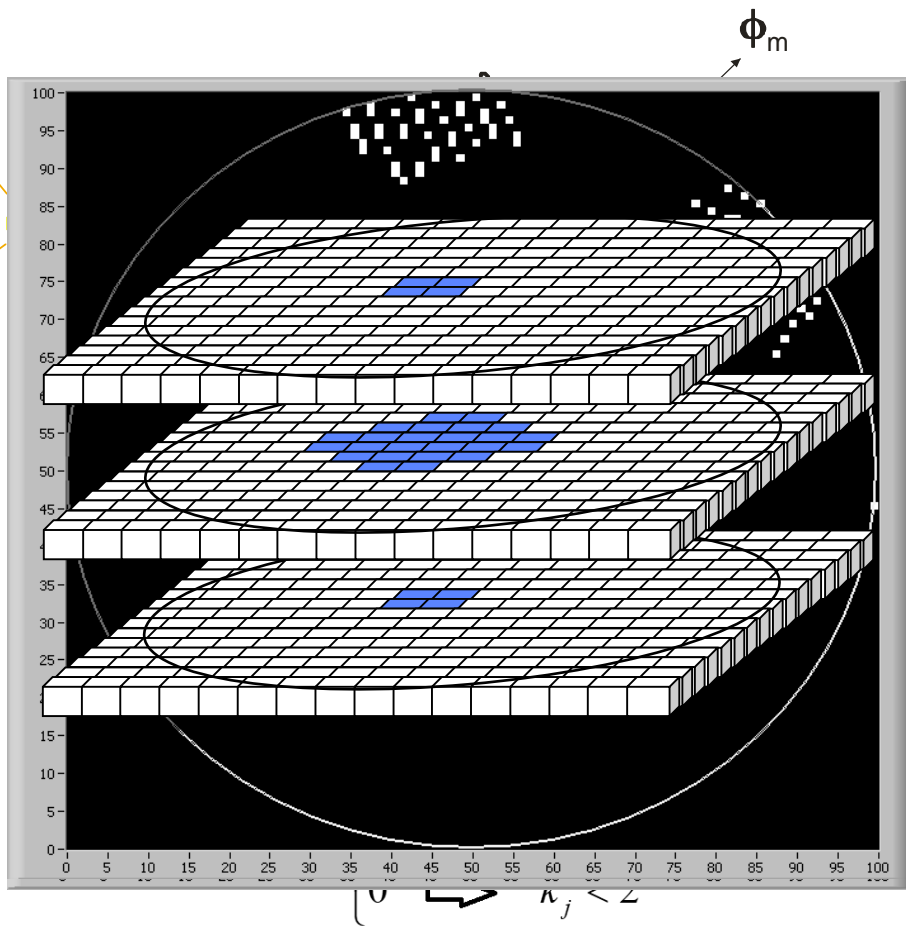
BUBBLES



DISCRET OPTICAL TOMOGRAPH

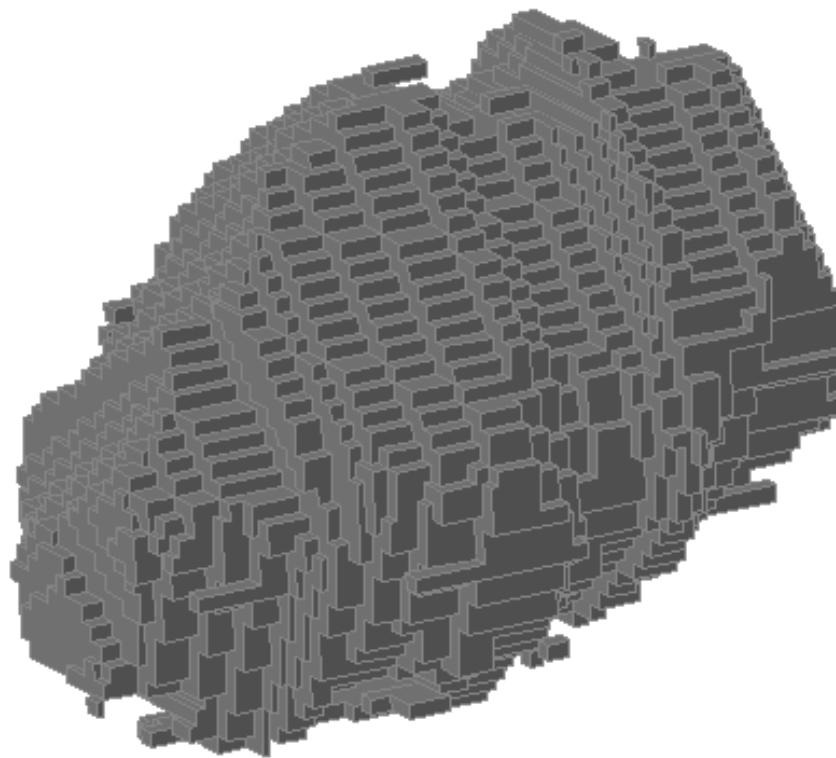


DISCRET OPTICAL TOMOGRAPHY



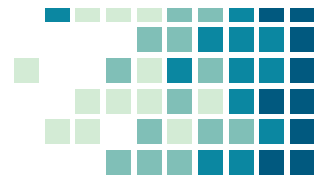
$F[r]$

i

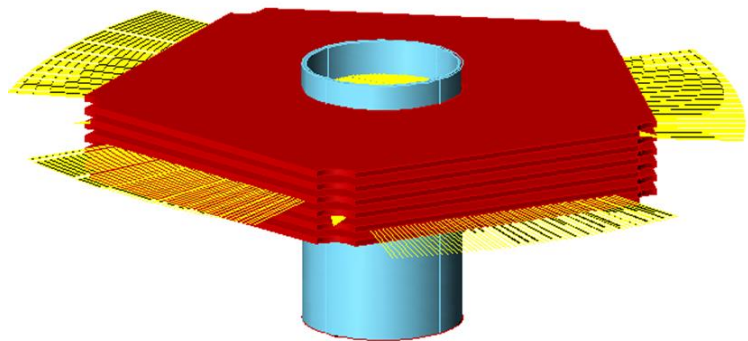


W

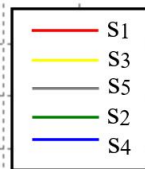
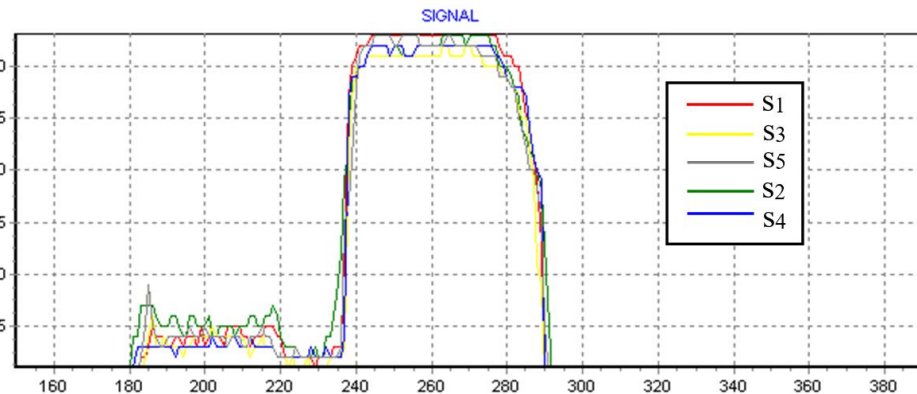
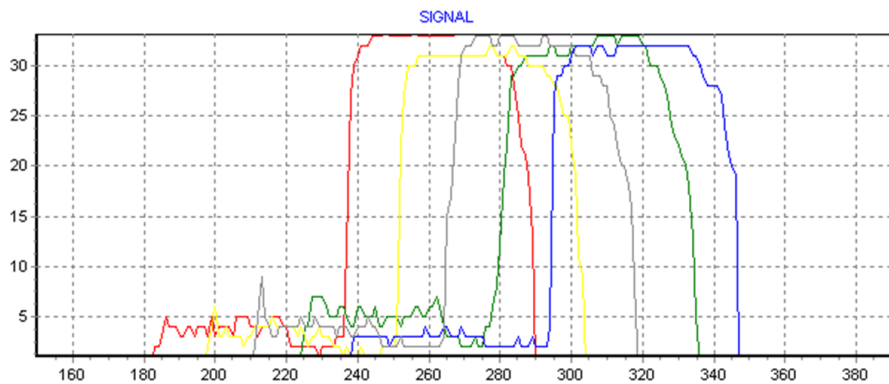
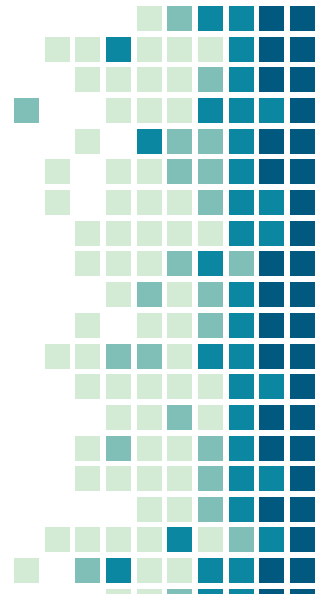
$$\begin{bmatrix} w_{31} & w_{32} & w_{33} & w_{34} \\ w_{41} & w_{42} & w_{43} & w_{44} \end{bmatrix}$$



BUBBLES VELOCITY



$$N^{shift} = \begin{bmatrix} 0 & n_{1,2} & n_{1,3} & n_{1,4} & n_{1,5} \\ n_{2,1} & 0 & n_{2,3} & n_{2,4} & n_{2,5} \\ n_{3,1} & n_{3,2} & 0 & n_{3,4} & n_{3,5} \\ n_{4,1} & n_{4,2} & n_{4,3} & 0 & n_{4,5} \\ n_{5,1} & n_{5,2} & n_{5,3} & n_{5,4} & 0 \end{bmatrix}$$





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Thank you for your
attention

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