MŰEGYETEM 1782

DISTRIBUTION OF SRF PARTICLES IN BUBBLING FLUIDIZED BED

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CONTENT

- The importance of vertical mixing
- The examined fuel: SRF
- Measured variables
  - Bed particle size distrubution
  - Fluidization gas velocity
- Cold fluidization equipment
- The research method: Bed-frozen method
- Results

THE IMPORTANCE OF VERTICAL MIXING

- Floating to the surface
  - Advantage of FBC technique not utilized
- Being located in the bed body
  - Excelent mixing & heat transfer
- Sinking to the bottom
  - O_2-rich atmosphere → intensive burn
  - High NO_x and CO concentration
  - Danger of agglomeration formation
  - Danger of nozzle demages

THE EXAMINED FUEL: SRF

Solid Recovered Fuel

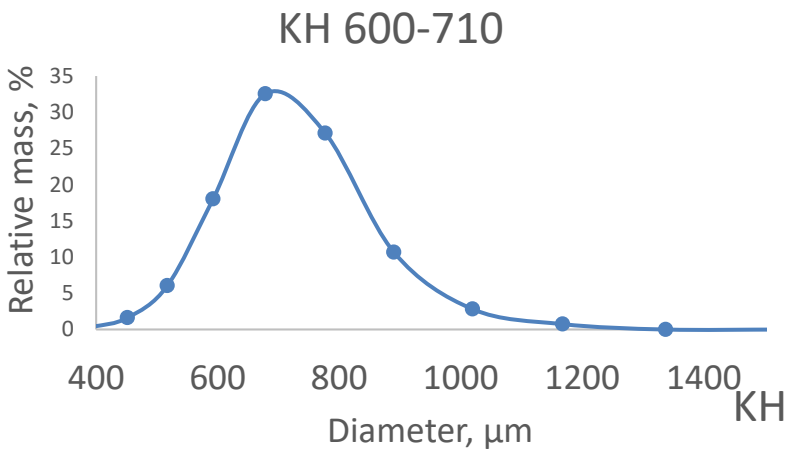
- Municipal waste-based fuel
  - Plastic
  - Fabric
  - Rubber
- Nonspherical

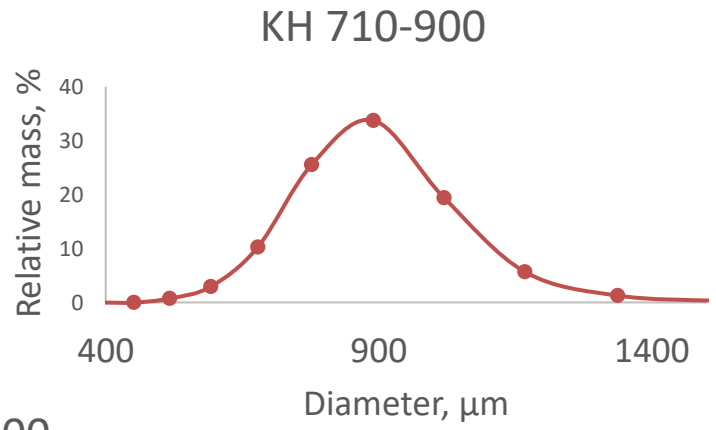
Inhomogeneous→ other inhomogenities minimized

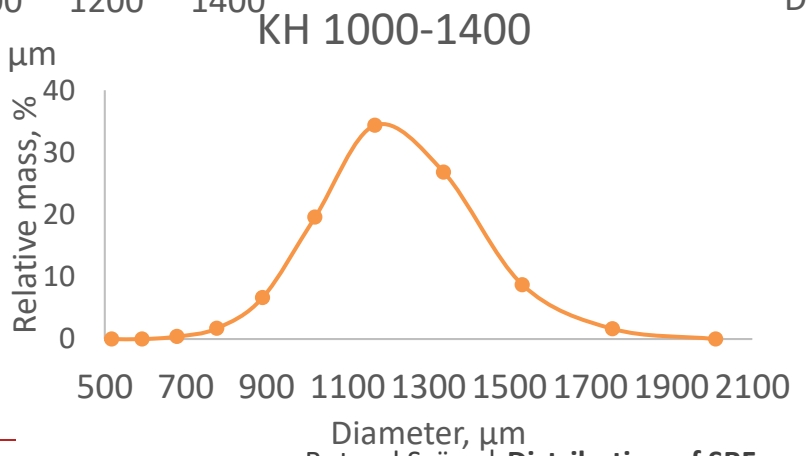
- Bed particle size distribution
- The same SRF sample backmixed

BED PARTICLE SIZE DISTRUBUTION

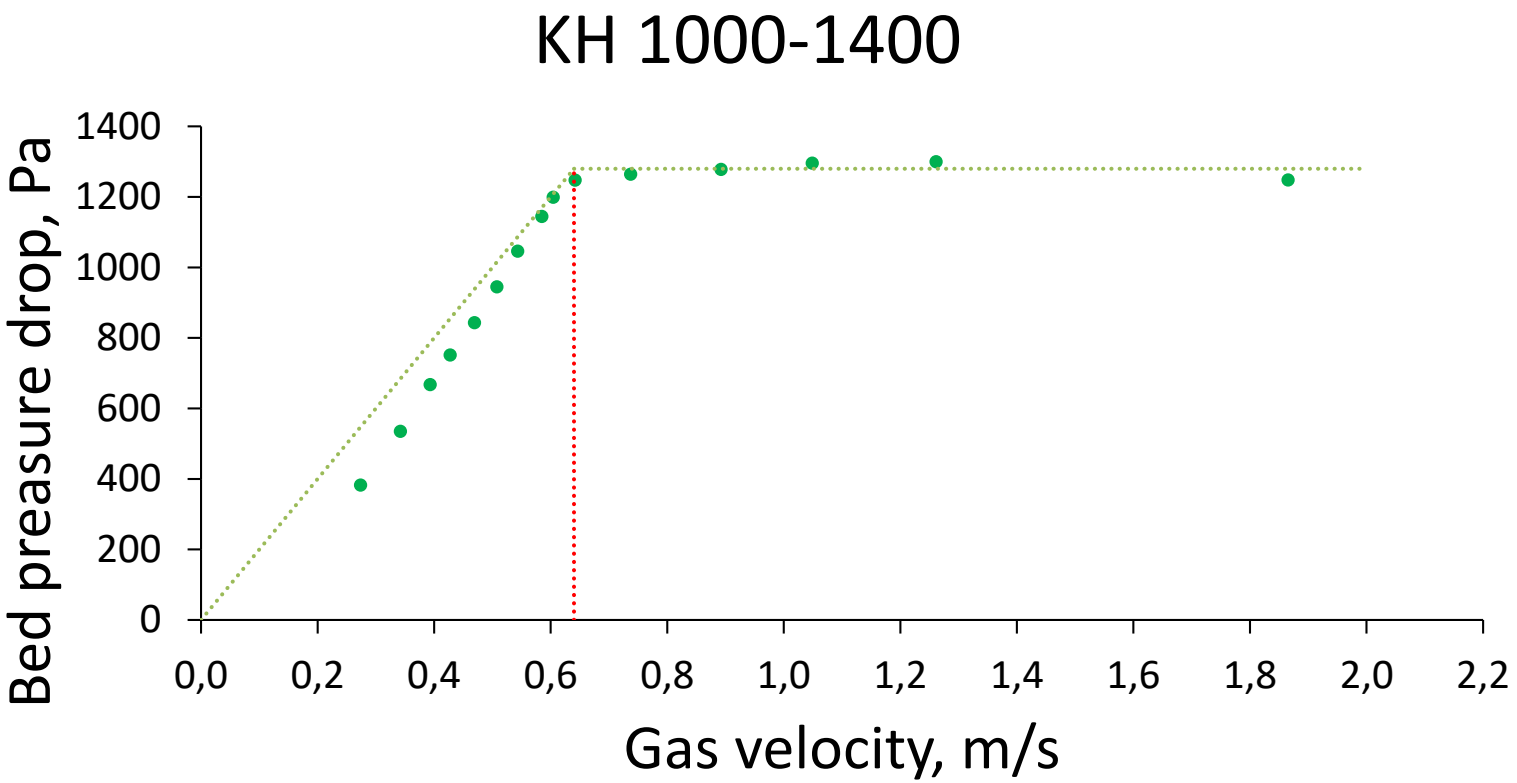
- Bed material: silica sand
- Sifted sand samples



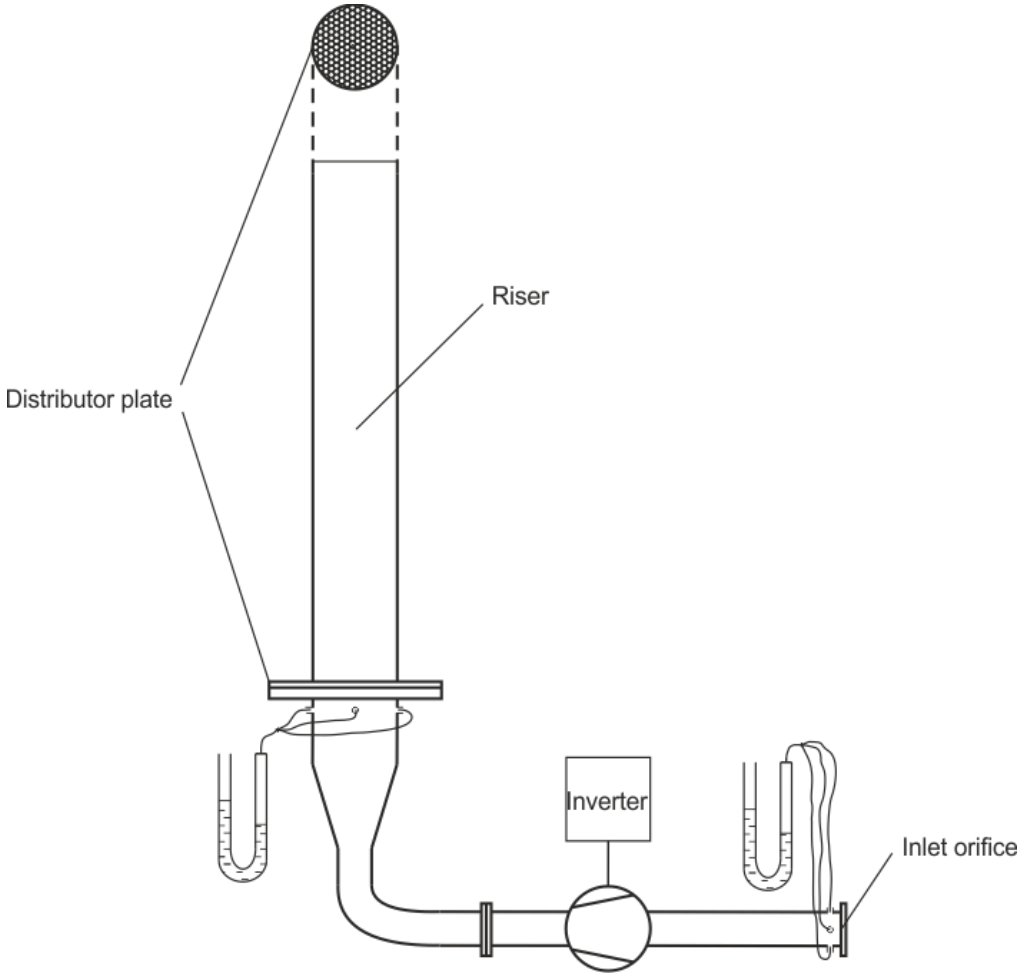




MINIMAL FLUIDIZATION GAS VELOCITY



COLD FLUIDIZATION EQUIPMENT

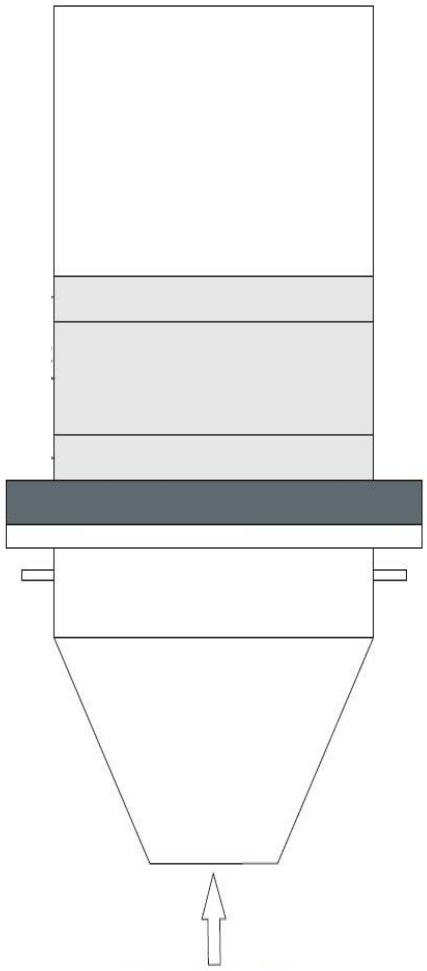


BED-FROZEN METHOD

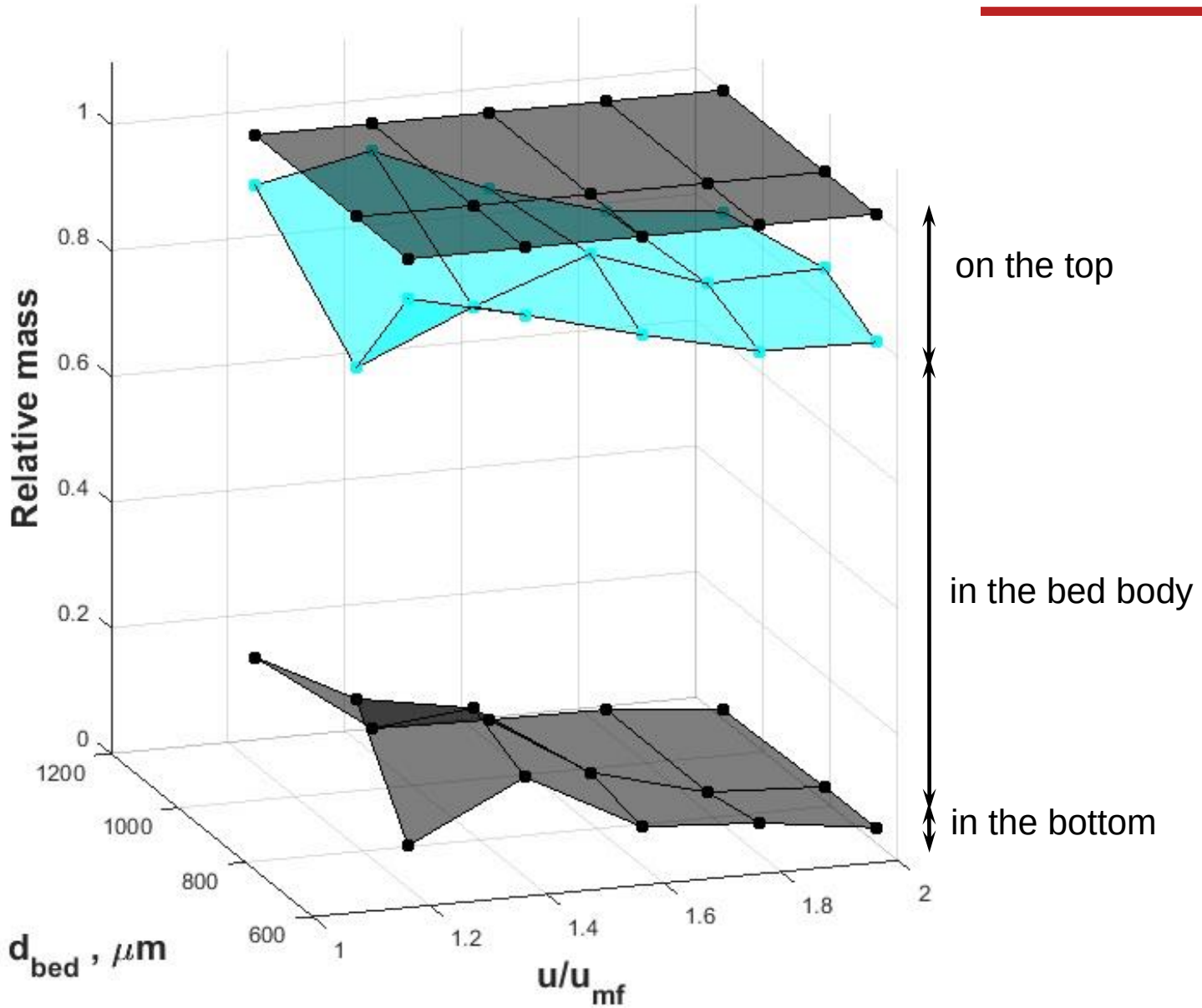
- The bed divided into three sections
  - Lower part, 0-2cm
  - Midle part, 2-10cm
  - Upper part, 10-12cm

1. Stationary fluidized state (>20 min)
2. Fluid air taken away→ frozen bed
3. Separated the cells

- Examination of fuel accumulated in singular sections



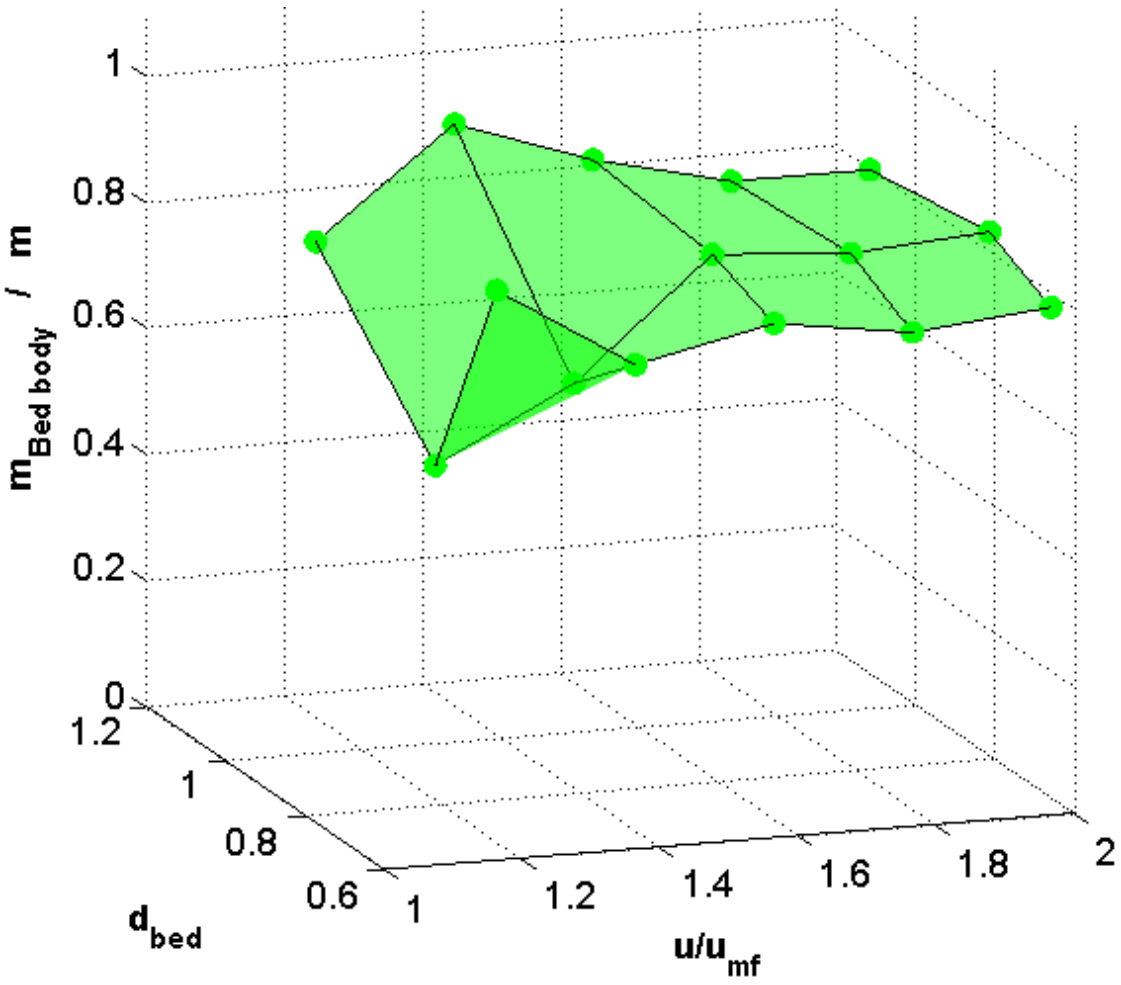
RESULTS


Relative mass
1
0.8
0.6
0.4
0.2
0
1200
1000
800
600
d_{bed} , μm
1
1.2
1.4
1.6
1.8
2
u/u_{mf}
on the top
in the bed body
in the bottom

MIXING INDEXES

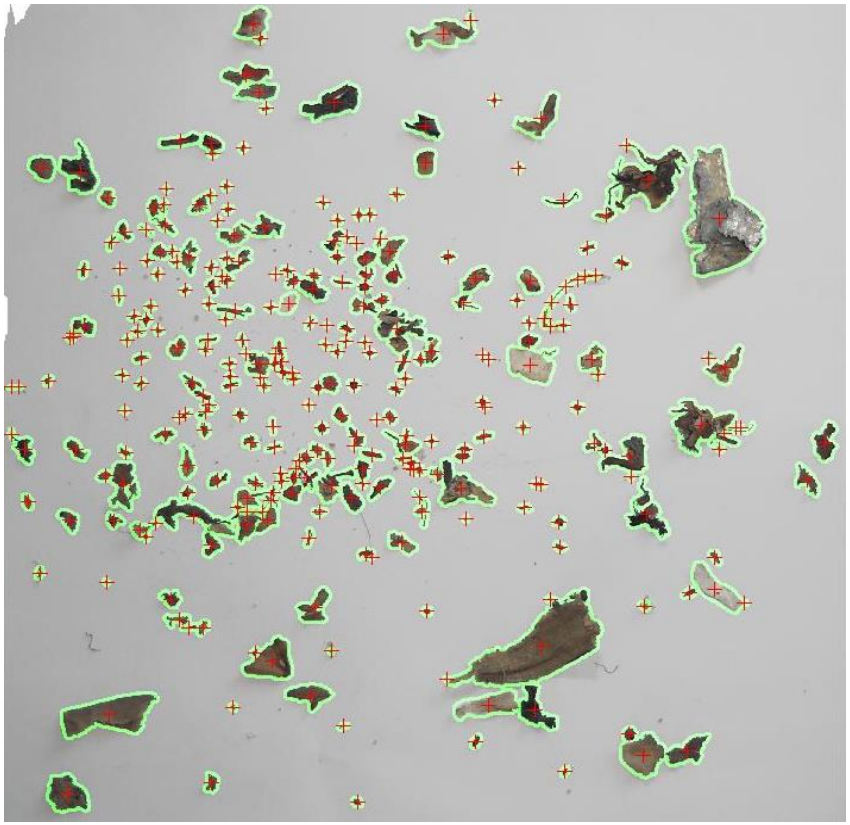
- Kramer's index $\frac{\sigma_0^2-\sigma^2}{\sigma_0^2-\sigma_r^2}$
- Nienow for jetsam $\frac{x_{\text{Top}}}{\bar{x}}$
- Nienow for flotsam $\frac{x_{\text{Bottom}}}{\bar{x}}$
- Proposed index $\frac{m_{\text{Bed body}}}{m}$

RESULT: MIXING INDEX

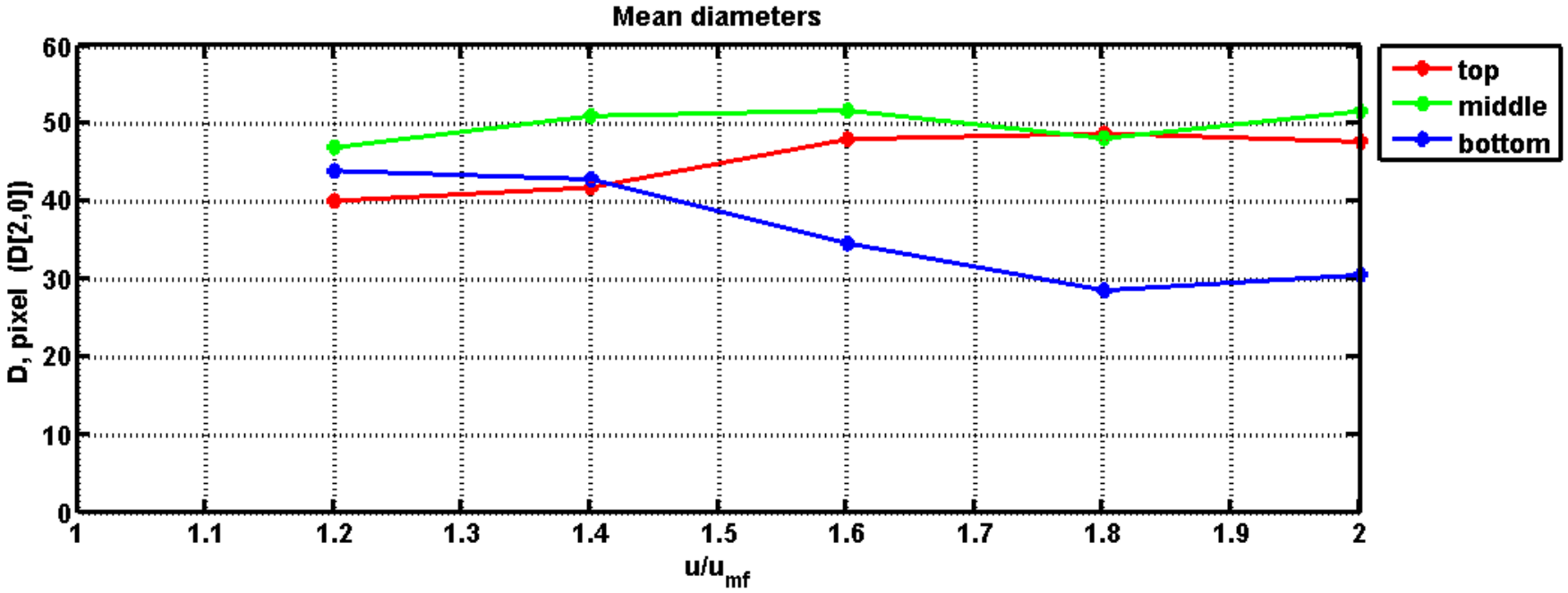


RESULTS: ACTIVE PARTICLE SIZES

- Nonspherical SRF flats (near 2D)
- Image processing method



RESULTS: ACTIVE PARTICLE SIZES



- – Biggest particles permanently in the middle
- – Smallest particles in the bottom (in case of hihg gas velocities)
- – Systematic shift

FUTURE PLANS

- Density measurement
- Theoritical
- Numerical
- Mathematical description

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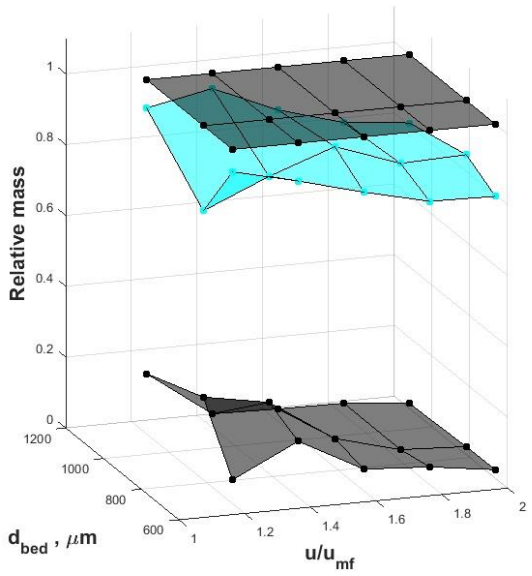
THANK YOU FOR YOUR KIND ATTENTION



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