

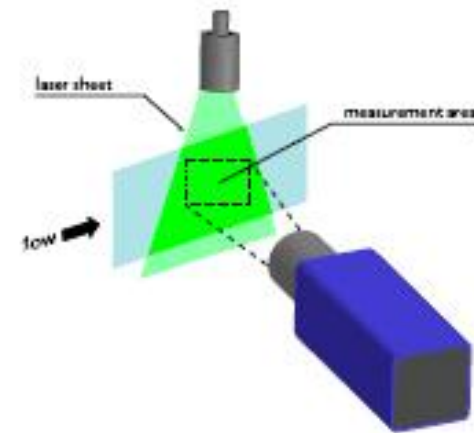
The measurements at the headbox slice channel

Hannu Eloranta

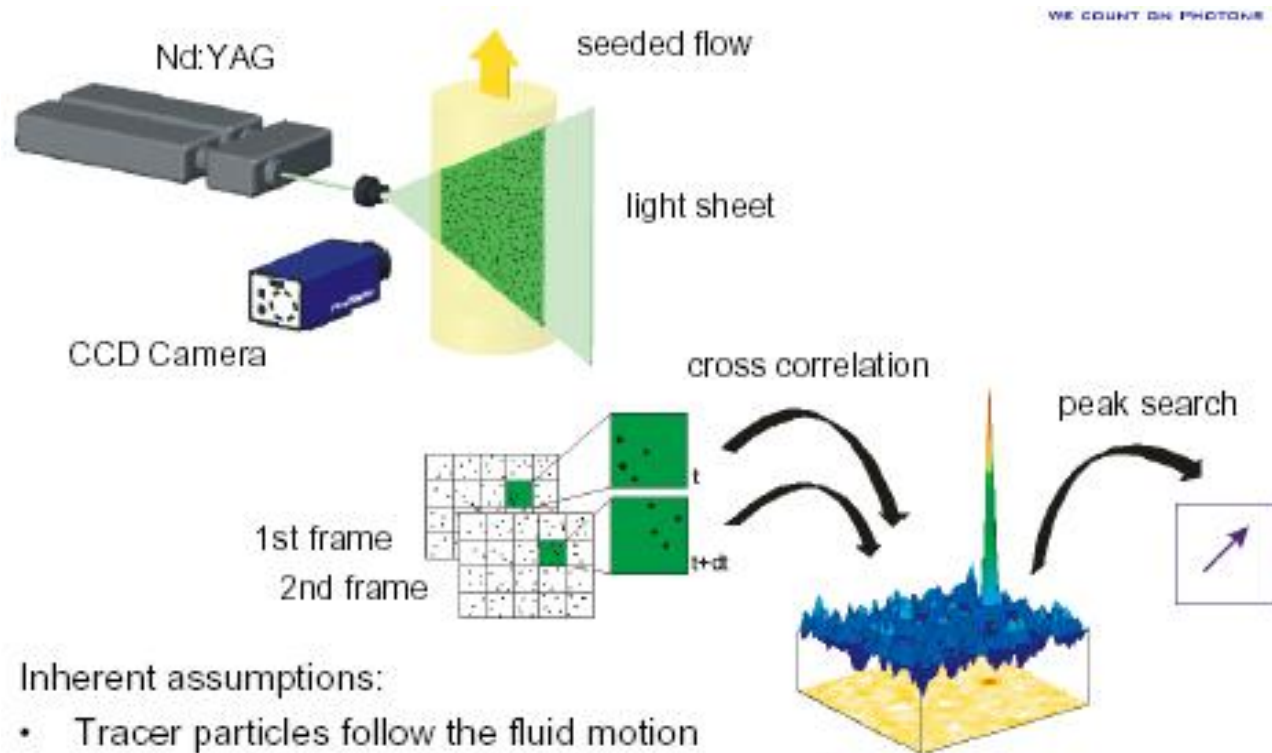
Pentti Saarenrinne

Velocity measurements

- 2D2C-PIV on the MD-ZD plane of the model
- Typically a set of 1000 samples (images) is collected
- Reynolds averaged statistical quantities are calculated
- U_{AVG} , u_{RMS} , ...



Particle Image Velocimetry



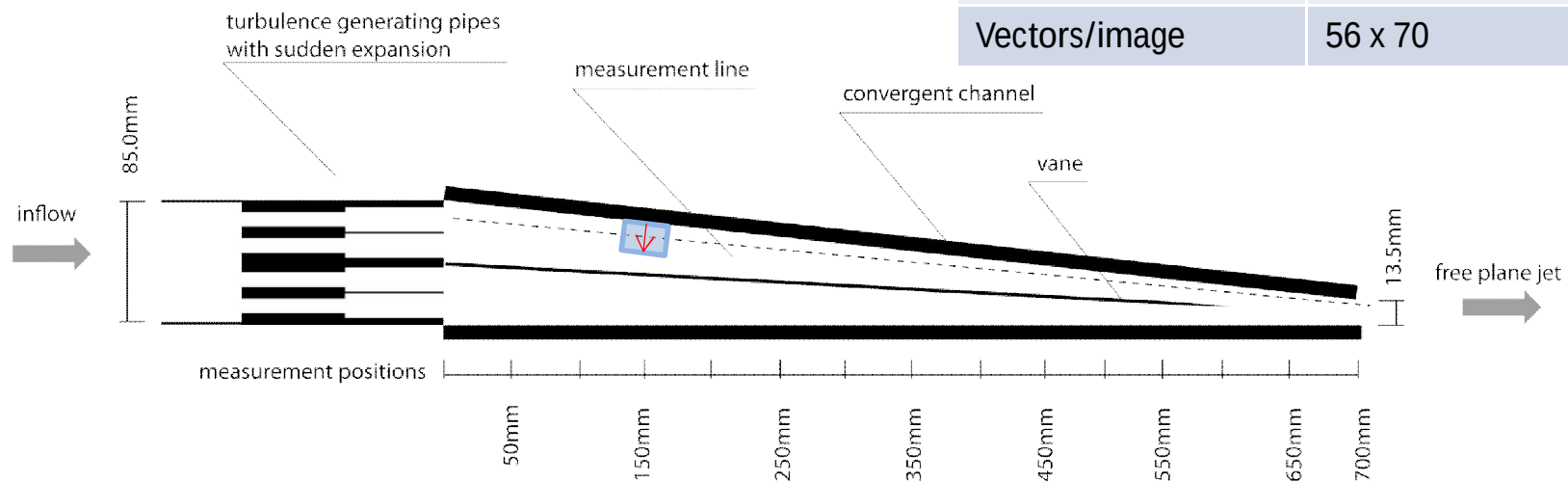
Inherent assumptions:

- Tracer particles follow the fluid motion
- Tracer particles are distributed homogeneously
- Uniform displacement within interrogation region

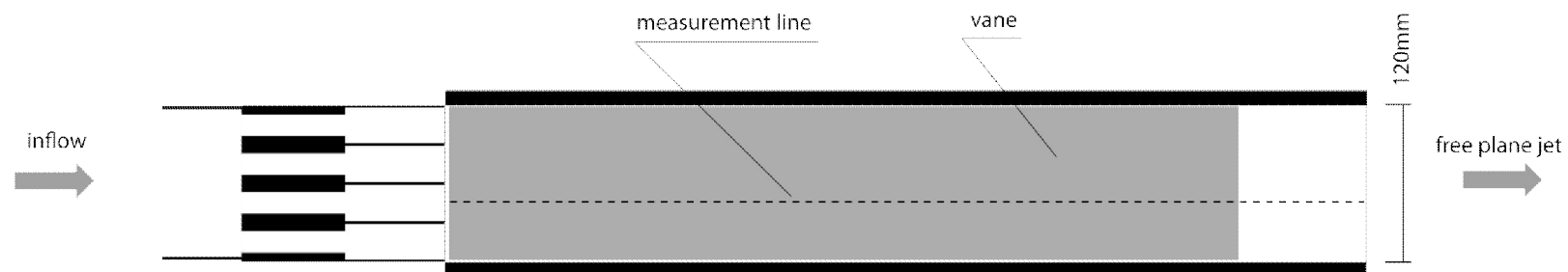
The headbox model

Quantity	
Image area	10,1 x 12,6 mm ²
Spatial resolution	0,18 [mm]
Vector averaging	3 x 3 IA:s
Frame rate	4 [1/s]
Vectors/image	56 x 70

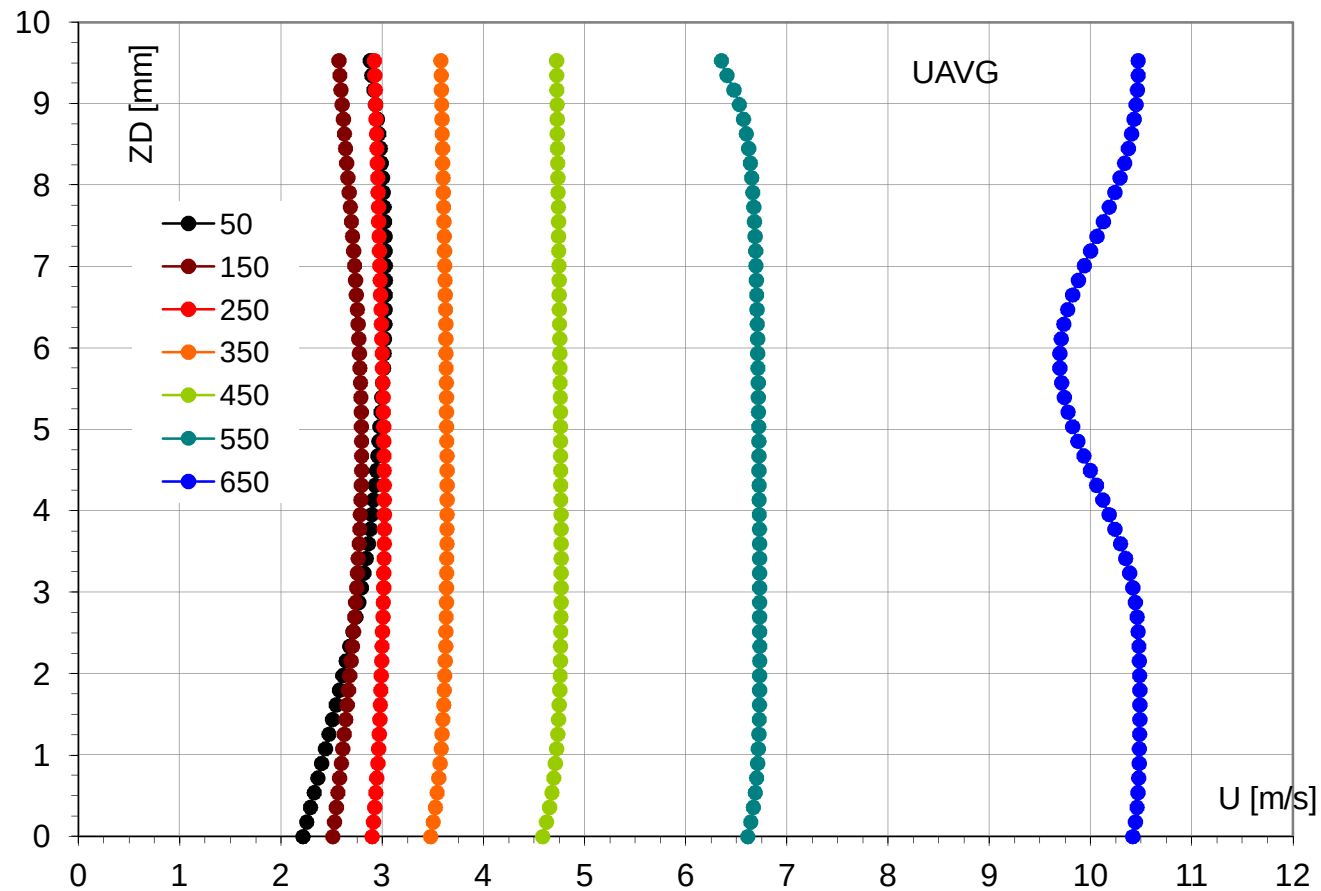
a) channel sideview (MDZD-plane)



b) channel topview (MDCD-plane)

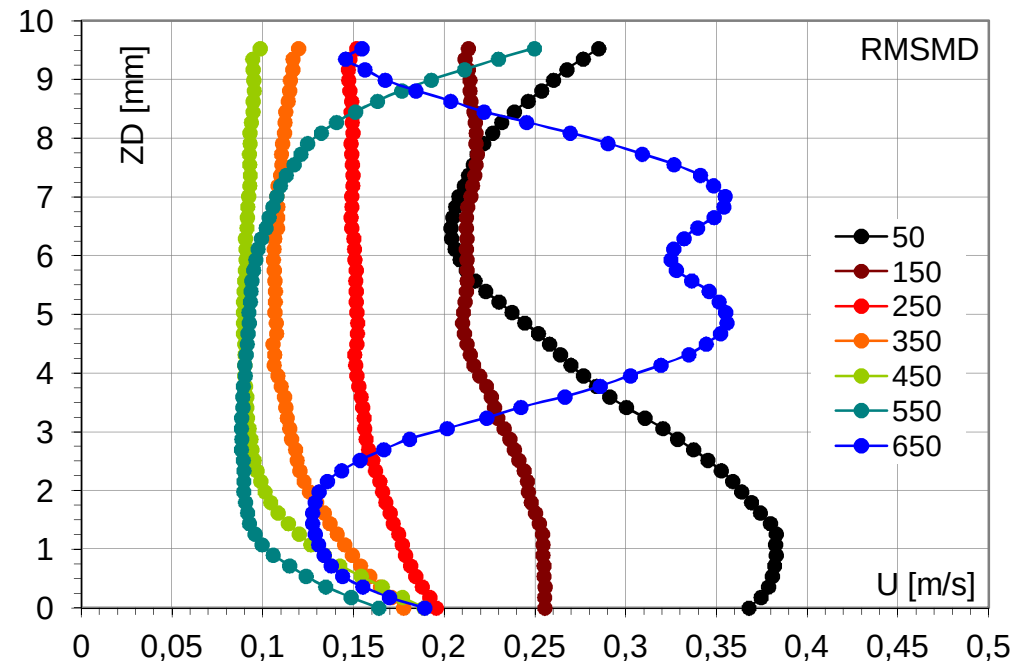


U_{AVG} profiles at different locations

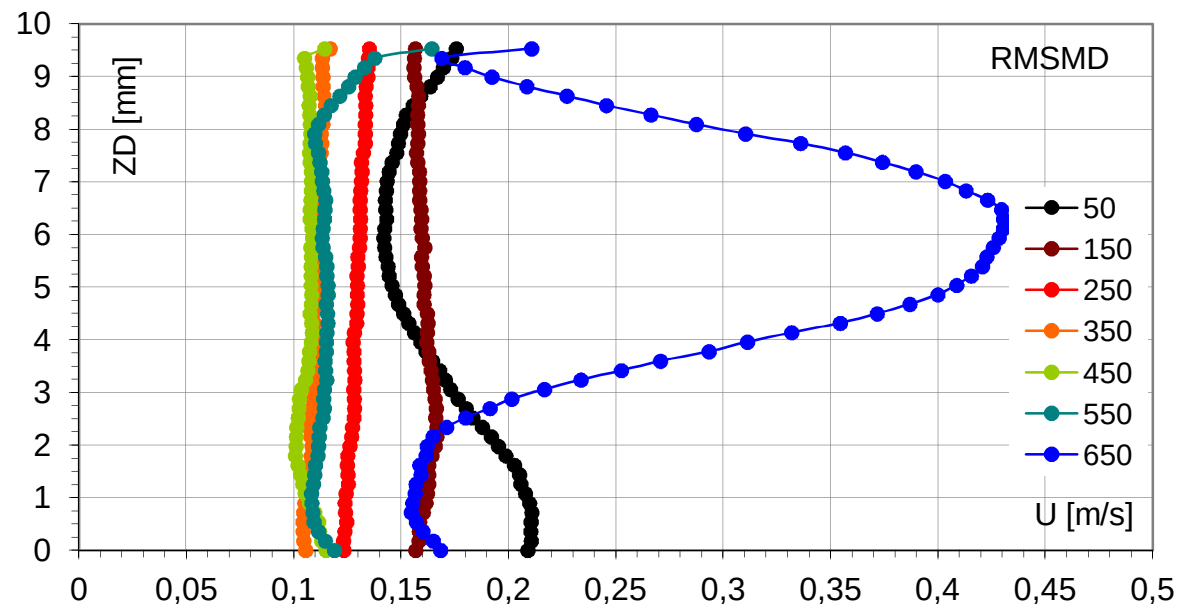


U_{RMS}, V_{RMS}

1. Chart RMS_MD



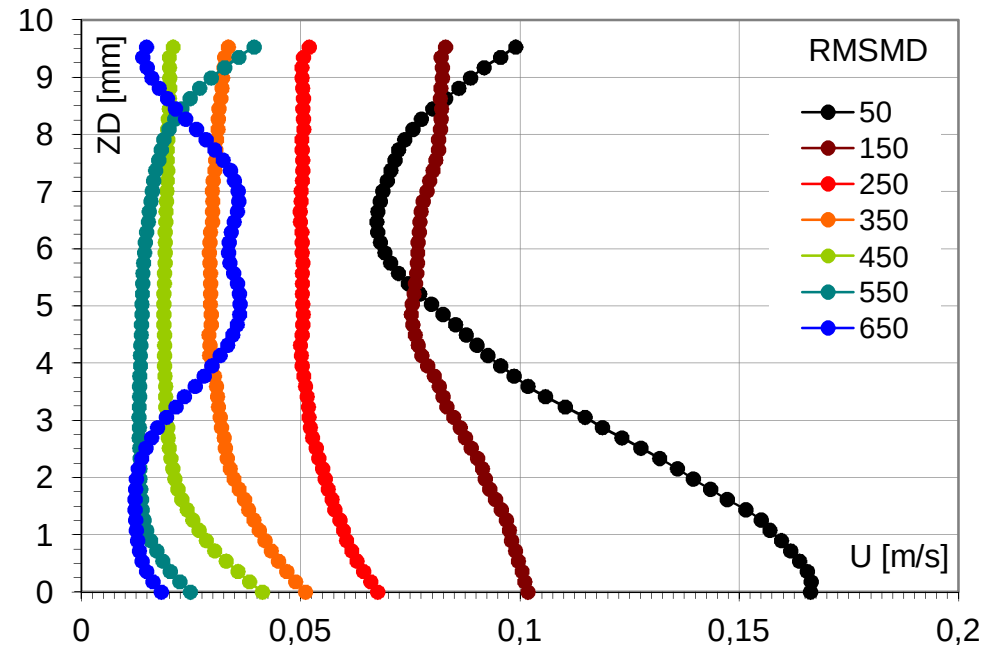
2. Chart RMS_ZD



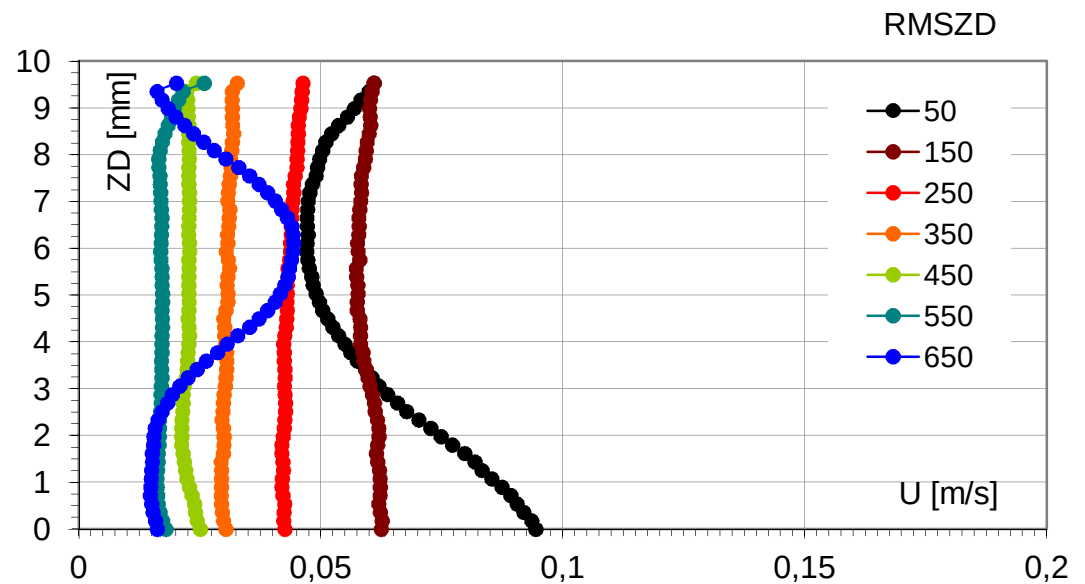
$$u_{RMS}/U_{AVG},$$

$$v_{RMS}/U_{AVG}$$

1. Chart RMS_MD_n_UAVG

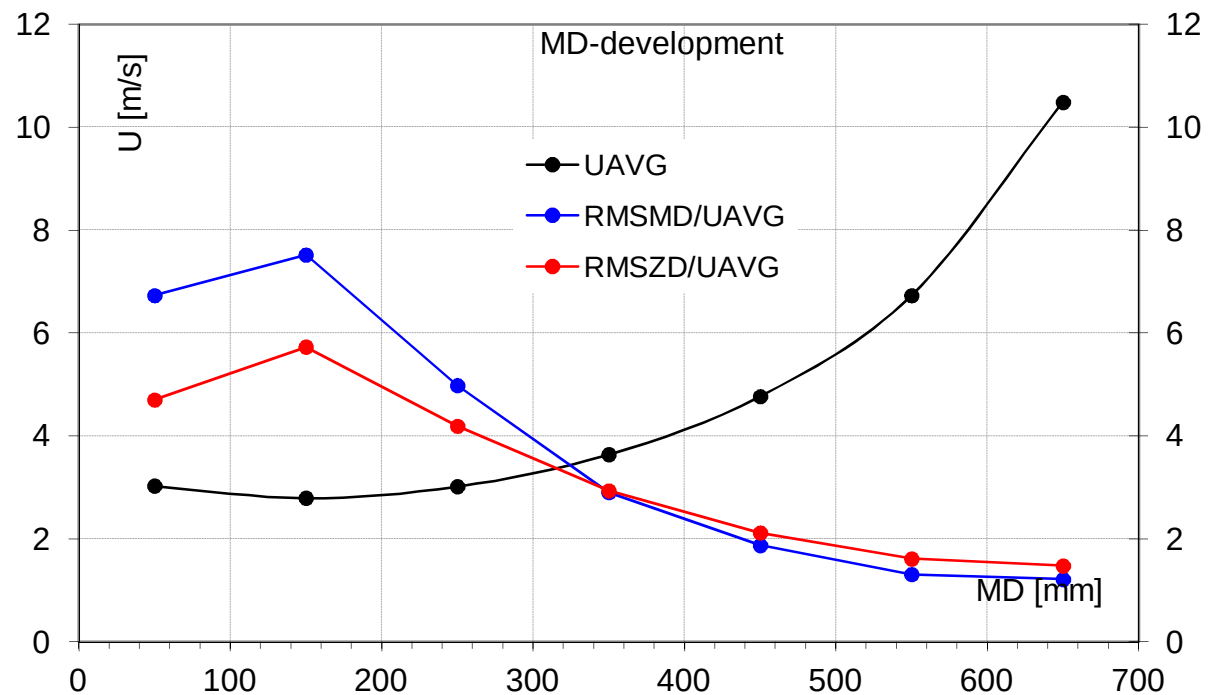
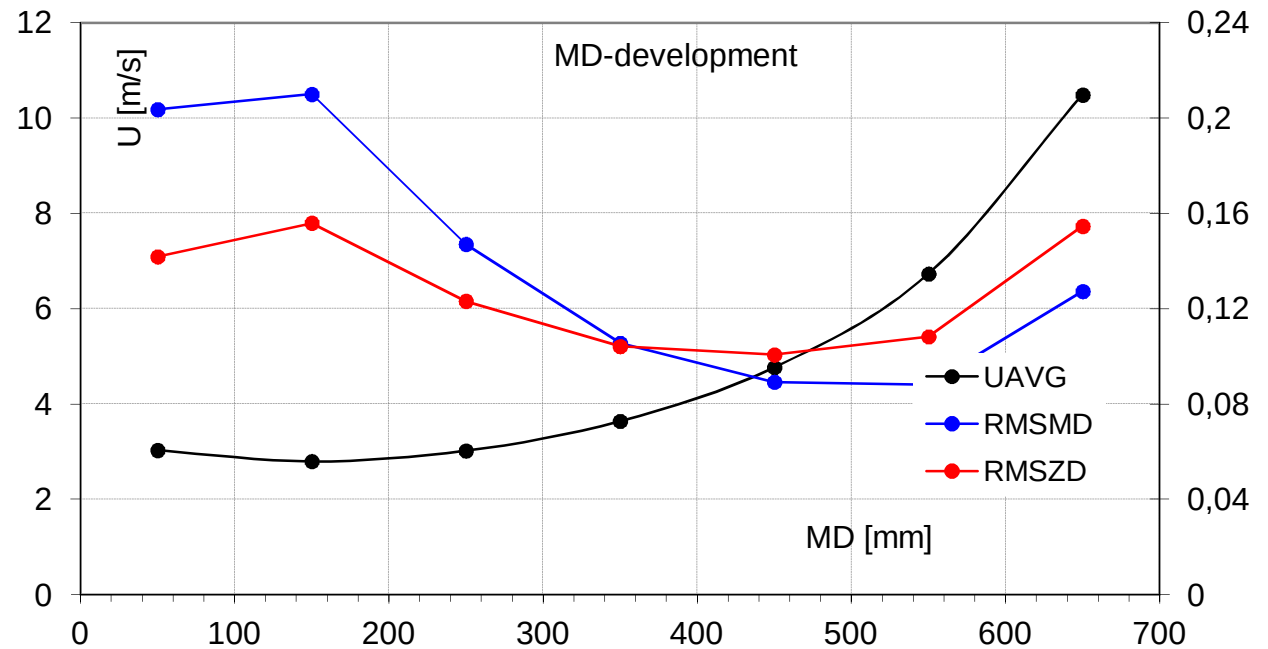


2. Chart RMS_ZD_n_UAVG



Relative development in M-direction

1. Chart MD-plot
2. Chart MD-plot (RMS%)



Data Table for U_{AVG}

UAVG	x							
y	50	150	250	350	450	550	650	
0	2,21336	2,50904	2,89671	3,47601	4,58319	6,60971	10,416	
0,179797	2,25091	2,52633	2,91022	3,50145	4,62102	6,64005	10,4405	
0,359594	2,28794	2,54338	2,92261	3,52233	4,65097	6,6653	10,4564	
0,53939	2,32561	2,55973	2,93339	3,54038	4,67415	6,68399	10,4658	
0,719187	2,36209	2,5762	2,94406	3,55619	4,6924	6,69732	10,4735	
0,898984	2,39898	2,59298	2,95409	3,56902	4,70743	6,70721	10,4779	
1,078781	2,43647	2,60728	2,96123	3,57955	4,7206	6,71399	10,48	
1,258578	2,47108	2,62261	2,96812	3,58872	4,73165	6,7194	10,4818	
1,438374	2,5065	2,63699	2,97387	3,59709	4,73924	6,72308	10,4837	
1,618171	2,54148	2,65033	2,97876	3,60459	4,74643	6,72484	10,4842	
1,797968	2,57475	2,66306	2,98359	3,61057	4,75217	6,7262	10,4836	
1,977765	2,60872	2,67559	2,98774	3,61565	4,75536	6,72713	10,4818	
2,157562	2,64134	2,68903	2,99166	3,62019	4,75823	6,72822	10,4799	
2,337358	2,6748	2,70163	2,99611	3,62425	4,76021	6,72893	10,4752	
2,517155	2,7069	2,71305	3,00039	3,62673	4,76127	6,72742	10,4675	
2,696952	2,73737	2,72456	3,00434	3,62908	4,76292	6,72699	10,4567	
2,876749	2,7661	2,73529	3,00807	3,63196	4,76406	6,72747	10,4389	
3,056546	2,79186	2,74471	3,01132	3,63361	4,76493	6,72761	10,4145	
3,236342	2,81594	2,75302	3,01326	3,63462	4,76609	6,72627	10,3832	
3,416139	2,83914	2,76098	3,01534	3,63527	4,76651	6,7257	10,3432	
3,595936	2,8608	2,76881	3,01698	3,63622	4,76562	6,72512	10,2926	