

Contents

1	Introduction	1
1.1	Motivation	1
1.2	State of the Art	3
1.3	Objectives	17
2	Fundamentals	20
3	Methodology	32
3.1	Experimental Description	32
3.1.1	Coordinate System	32
3.1.2	Experimental Facilities	32
3.1.3	Model Geometries	34
3.1.4	Campaigns	38
3.1.5	Measurement with PIV	38
3.2	Processing	46
3.2.1	Data Evaluation	46
3.2.2	Pre-processing in VEE	46
3.2.3	Processing in VEE	49
3.2.4	Uncertainty Analysis	52
4	Results	65
4.1	Vortex Topology	65
4.2	Velocity Distribution and Development	75
4.3	Energetic Analysis	81
4.3.1	Viscosity	86
4.3.2	Wing-loading	90
4.4	Intermediate Summary	97
4.5	Vortex Dynamics	98
4.6	Vortex Intensification	106

4.7	Coherent Structures	107
4.8	Turbulence.....	112
4.9	Tilting Effects.....	118
4.10	Swirl Conversion.....	123
5	Summary	131
6	List of References	134