

CONTENT

1 INTRODUCTION	5
2 MOTIVATION AND SCOPE OF THE PRESENT WORK.....	6
3 THEORY AND APPLIED METHODS	7
3.1 Laser Doppler anemometry (LDA)	8
3.2 Computational FluidS Dynamics (CFD)	8
3.3 Proper orthogonal decomposition.....	8
3.4 Energetic assessment	9
4 TEST CASES	9
4.1 Swirl generator apparatus designed at Brno university of technology ("BUT")	9
4.2 Swirl generator apparatus designed at "Politehnica" University of Timisoara ("UPT") ..	10
PART I - INVESTIGATION OF SWIRLING FLOW GENERATED BY THE "BUT" SWIRL GENERATOR	11
5 VELOCITY MEASUREMENTS IN THE CONICAL DIFFUSER.....	11
6 UNSTEADY PRESSURE PULSATIONS	11
7 HIGH SPEED CAMERA RECORDING OF THE CAVITATING VORTEX ...	12
8 CFD CALCULATION OF "BUT" SWIRL GENERATOR	13
9 COMPARISON OF EXPERIMENTAL MEASUREMENTS AND NUMERICAL RESULTS	14
9.1 Time evolution of numerically computed spiral vortex	14
9.2 Comparison of velocity results.....	15
10ENERGY DISSIPATION IN THE DOWNSTREAM PART OF THE DIFFUSER	16
PART II POD ANALYSIS.....	17
11POD ANALYSIS OF "BUT" SWIRL GENERATOR	17
11.1 POD of numerically computed pressure fields	18
12POD ANALYSIS OF "UPT" SWIRL GENERATOR WITH THE AXIAL WATER INJECTION	18
12.1 Numerical set-up	19
12.2 Decelerated swirling flows with the axial water injection.....	19
12.3 5% jet discharge	20
13CONCLUSIONS	22
LITERATURE	25
CURRICULUM VITAE	29
ABSTRACT	30