BRNO UNIVERSITY OF TECHNOLOGY
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Investigation of pressure swirl sprays using Volumetric PIV

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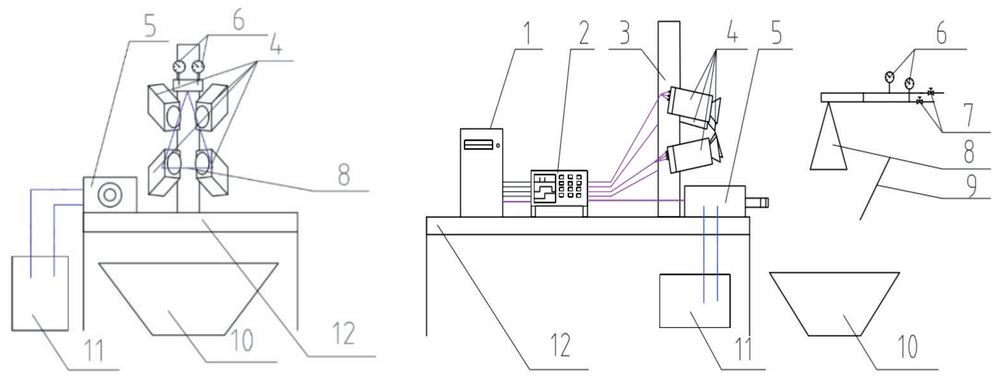
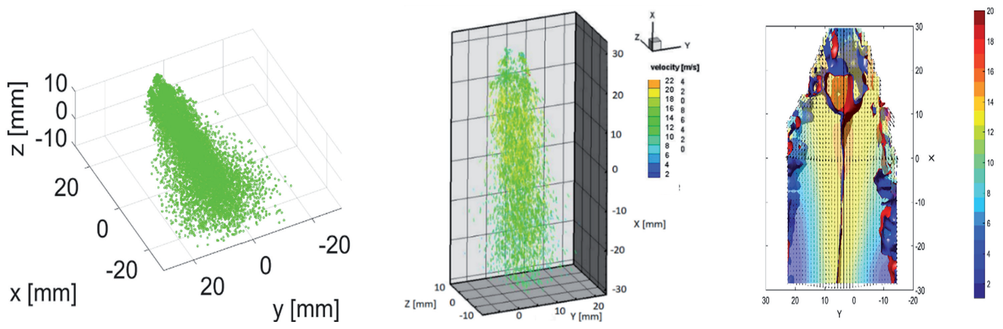
INTRODUCTION

• Two pressure swirl atomizers (PSAs) (i.e. spill-return and simplex atomizers) were examined by means of a volumetric 3-component velocimetry (V3V-Flex©, TSI Inc.) • The water droplets generated by the spray were used as natural tracers, no additional seeding particles were added to the flow. • Comparison of pressure swirl atomizers was made.



EXPERIMENTAL SETUP

1-Computer, 2-Synchronizer, 3-Mounting system for the cameras, 4-Cameras, 5-Laser, 6-Pressure sensors, 7-Control valves, 8-Hollow cone spray, 9-Mirror for the laser deflection, 10-Vessel collecting discharged water, 11-Water cooling system for the laser, 12-Working table.

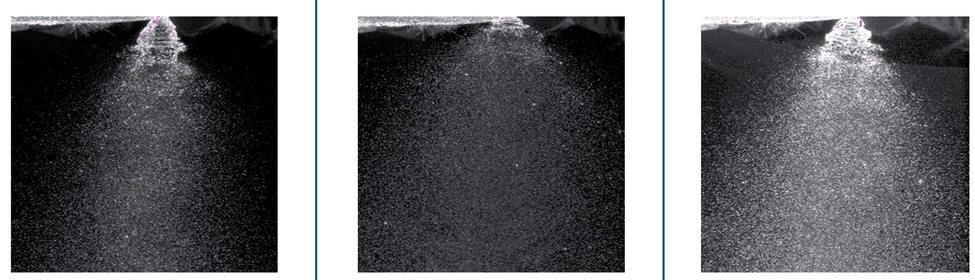


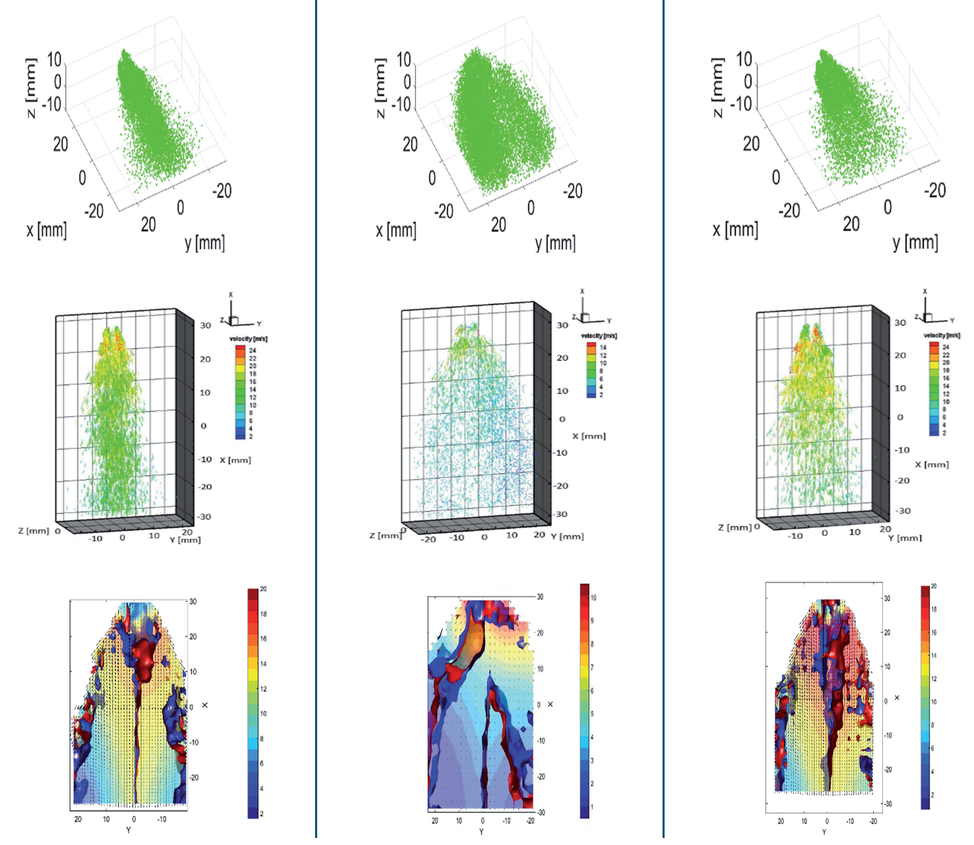
RESULTS

• Five experiments were made for two pressures (3.5 bar and 4.5 bar) with open and closed spill-return orifices. • Particle position, velocity vector field and vorticity of different atomizers and different test condition are compared.

RESULTS

Pin = 3.5 *bar*, SL = closed | *Pin* = 4.5 *bar*, SL = open | *Pin* = 4.5 *bar*, SL = closed





CONCLUSION

• The difference between the PSA design and the influence of different test conditions, i.e. inlet pressure and SL valve adjustment were readily observed. • Change in velocities and spray cone angle were observed at different test conditions. • Results obtained are found to be in agreement with the PSAs theory. • The suitability of V3V-Flex© for spray flows investigation is proved in this study.

ACKNOWLEDGEMENT

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