Abstracts of MMA2015, May 26–29, 2015, Sigulda, Latvia
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MODELLING OF AIR FLOW IN THE MULTI-CHANNEL CYCLONE

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The cyclones are widely used to separate dust and particles from gas. They are so popular due to their simple construction and economy [1]. Despite the simple structure of the cyclone, the mathematical analysis of air motion in the cyclone is quite complicated. A large number of works are dedicated to the air flow modeling in the cyclones of various design. We analyze the multi-channel cyclone [2].

The air flow motion in the cyclone describes the system of nonlinear differential equations. This system consist of continuity and momentum equations (Navier-Stokes equations). For the modelling of the turbulence the Reynolds time averaging technique for this system is used ([3]) and the new system of equations – Reynolds averaged Navier-Stokes equations (RANS) is derived. This system include the additional unknown quantities (Reynolds stress tensor).

The virtual model for the four-channel cyclone is created using real parameters. The system of differential equations is solved numerically using ANSYS FLUENT ([4]). The numerical and experimental results are compared. The impact of the construction to the air flow in the cyclone is analyzed. The air flow velocity and static pressure distribution in the channels of the cyclone is presented and analyzed. These results can be used for the modelling of particle motion in the multi-channel cyclone.

REFERENCES

[1] M. Bohnet and O. Gottschalk and M. Morweiser. Modern design of aerocyclones. *Advanced Powder Technology*, **8** (2): 137-161, 1997.

[2] P. Baltrenas and P. Vaitiekunas and I. Jakstoniene and S. Konoverskyte. Study of GasSolid Flow in a Multichannel Cyclone. *Journal of Environmental Engineering and Landscape Management*, **20** (2): 129-137, 2012.

[3] D. C. Wilcox. *Turbulence Modeling for CFD*. DCW Industries, Inc., La Canada, California, 1994.

[4] . *ANSYS FLUENT 6.3 Documentation*. http://aerojet.engr.ucdavis.edu/fluenthelp/index.htm, .