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Moein Siadaty, Saeid Kheradmand, Fatemeh Ghadiri

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Research on the effects of operating conditions and inlet channel configuration on exergy loss, heat transfer and irreversibility of the fluid flow in single and double inlet cyclones

Moein Siadaty<sup>1</sup>, Saeid Kheradmand, Fatemeh Ghadiri

Department of Mechanical and Aerospace Engineering, Malek-Ashtar University of Technology, Shahin-Shahr, Isfahan, Islamic Republic of Iran

### Abstract

Entropy generation method is employed to scrutinize the exergy loss and entropy generation of the air flow during the cleaning process inside three conventional types of industrial cyclones, i.e. single inlet, conventional double inlet and spiral double inlet. Different mechanisms of the entropy generation including; direct, turbulent and thermal dissipations are studied. Results show that the presence of the second inlet decreases irreversibility. Spiral double inlet cyclone saves up to 12.33% of the flow exergy in comparison with the single inlet one, while for the simple double inlet cyclone this value is about 7.63%. The highest value of irreversibility is observed at the entrance region of the vortex finder. While, this value is lower in double inlet cyclones in comparison with single inlet one. Moreover, the interesting relation between the convection coefficient and irreversibility indicates that 75% increase in convection coefficient leads to a 5% reduction in averaged turbulent entropy generation.

### Keywords:

Entropy generation, exergy loss, irreversibility, cleaning process, cyclone

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<sup>1</sup>Corresponding Author. Tel: +989127316043

Email addresses: [moein.siadaty@gmail.com](mailto:moein.siadaty@gmail.com), [moein.siadaty@mut-es.ac.ir](mailto:moein.siadaty@mut-es.ac.ir) (M. Siadaty), [kheradmand@mut-es.ac.ir](mailto:kheradmand@mut-es.ac.ir) (S. Kheradmand), [f.ghadiri@mut-es.ac.ir](mailto:f.ghadiri@mut-es.ac.ir) (F. Ghadiri)

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