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جـامـعـة قـسـنـطـيـنـة 1 – الإخــوة مـنـتـوري
كليــــــــــــة العلوم الد قيـــقة

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA
MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH
Constantine 1 University – Frères Mentouri
Faculty of Exact Sciences

ANNONCE DE SOUTENANCE

Conformément à la décision n° **35/D3C/2026** du **06 Avril 2026** autorisant la soutenance d'une thèse de doctorat, le Vice-doyennat chargé de la post-graduation, de la recherche scientifique et des relations extérieures, a n n o n c e la soutenance publique d'une thèse de doctorat le :

Mardi 12 Mai 2026 à 16 HOO

Lieu : Salle de conférences sise au Campus Chaab Erssas.
Filière : PHYSIQUE
Spécialité : Energies Renouvelables

Doctorant : BOUDELLIOUA Riad

Sur le thème : « Contribution à l'étude théorique des écoulements de Taylor-Couette horizontaux soumis à un flux solaire ».

Devant le jury d'examen :

	Nom et prénoms	Grade	Etablissement d'appartenance
Présidente	**CHAKER Abla**	Professeure	Université Constantine1, Frères Mentouri
Directeur de thèse	**BOUFENDI Toufik**	**Professeur**	**Université Constantine1, Frères Mentouri**
Examinateurs	DJEZZAR Mahfoud	Professeur	Université Constantine1, Frères Mentouri
	GUELLAL Messaoud	Professeur	Université Ferhat Abbes – Sétif 1 -
	HADDAD Zakaria	M.C.A	Université Mohamed Boudiaf – M'sila -
	TABET Ismail	M.C.A	Université 20 Août 1955 – Skikda -

Abstract

This thesis is part of a study of mixed convection in Taylor–Couette flows subjected to asymmetric thermal conditions. It aims to analyze the combined influence of rotation, buoyancy, and geometry on hydrodynamic stability and heat transfer, in order to identify the most relevant control parameters for optimizing the thermal performance of confined systems. Two configurations were explored: a vertical system with a constant heat flux applied to the outer wall, and a horizontal system integrated into a photo-thermal solar panel, where part of the outer wall is semi-adiabatic and the other part is subjected to a constant heat flux. In the vertical configuration, the study showed that the radius ratio plays a crucial role in the stability and efficiency of heat transfer. An increase in this ratio, corresponding to a narrowing of the gap, stabilizes the base flow but intensifies radial mixing by promoting the formation of a larger number of counter-rotating vortex cells.

In the horizontal configuration, more oriented towards energy applications, the position of the heat flux and the inclination of the panel proved to be key parameters. A heat flux applied to the lower part of the outer cylinder generates a synergy between rotational shear and Archimedes buoyancy, enhancing convection and improving heat transfer. Conversely, a heat flux applied to the upper part stabilizes the fluid and limits heat exchange. The inclination of the panel, particularly around 45°, optimizes this synergy between natural and forced convection, allowing for improved thermal performance without significantly increasing the mechanical power consumed.

These results highlight the complexity and richness of thermo-rotational interactions, while confirming the potential of Taylor–Couette systems as an innovative thermal management solution for hybrid solar devices, combining energy efficiency and sustainability.