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وزارة التعليم العالي والبحث العلمي
جامعة قسنطينة 1 – الإخوة منتوري
كليـــــــــة العلوم الد قيـقة

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° 124/ D3C/2026 du 12 Novembre 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 de :

THESE DE DOCTORAT DE

MECHEKEF Manal

EN Mathématiques, EN Mathématiques appliquées

Date : Mardi 17 Novembre 2026 - Heure : 16h00

Lieu : Salle de conférences sise au C a m p u s Ahmed Hamani (ZERZARA) .

Sur le thème : « Control and Hyperchaotification of chaotic dynamical systems ».

Devant le jury d'examen :

	Nom et prénoms	Grade	Etablissement d'appartenance
P r é s i d e n t e	BELKROUM Dounia	M.C.A	Université Constantine1, Frères Mentouri
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Abstract

"Relativity, quantum mechanics, and chaos are three achievements of the twentieth century that will remain forever in the memory of science." This statement was expressed by one of the scientists enthusiastic about scientific research, pointing to the great importance of chaos theory since its emergence. Indeed, chaos theory revealed new concepts that combine the strict determinism of the laws governing dynamical systems with an apparently random and complex behavior, which often manifests itself through fractal geometric structures. Motivated by this perspective, this thesis focuses on the study of chaotic and hyperchaotic dynamical systems, emphasizing both their theoretical and applied aspects. Advanced nonlinear tools are employed to analyze their fundamental properties, including equilibrium points, stability analysis, Lyapunov exponents, and bifurcation diagrams.

The main contribution of this work is the development of several methodologies for hyperchaotification of chaotic systems into hyperchaotic ones. In addition, effective control strategies are designed and applied to suppress chaotic behavior, stabilize the systems, or guide them toward desired states. Furthermore, the electronic circuit realization of these systems is investigated to demonstrate their practical applicability.

The validity of the theoretical results is confirmed through numerical simulations using MATLAB, Python and Multisim. The obtained results reveal the rich dynamical behavior of the proposed systems and demonstrate their potential usefulness in several practical applications, particularly in secure communications, cryptography, and nonlinear system modeling.