

SHIP HYDRODYNAMICS IN INLAND WATERWAYS

SAMI KAIDI^{* †}, PENG DU^{**}

* Direction Technique Eau, Mer et Fleuves, Cerema, 60280 Margny Lès Compiègne, France;
Sami.kaidi@cerema.fr

† Sorbonne universités, Université de Technologie de Compiègne, laboratoire Roberval,
60203 Compiègne cedex, France
Sami.kaidi@utc.fr

** School of Marine Science and Technology, Northwestern Polytechnical University
127 Youyi Road, Beilin, 710072 Xi'an, China
dupeng@nwpu.edu.cn

ABSTRACT

Inland navigation is a vital mode of transportation with substantial economic and ecological implications. Transporting cargo inland via water consumes 3.7 times less fuel per ton compared to road transport and emits four times less CO₂ than trucks. Moreover, thanks to mass transport, it costs two to seven times less, and its high-volume capabilities contribute to its cost-effectiveness. Additionally, the safety record of inland waterways is notably favorable, with fewer accidents compared to roads, rendering this mode of transport safer. For competitive reasons, inland vessels are increasingly larger and equipped with powerful propulsive systems.

The consequences of this evolution are multiple. Firstly, there is a noticeable effect on the hydrodynamics surrounding vessels [1], as confinement becomes more pronounced. Secondly, there is an impact on sediment suspension and erosion of the channel bed and banks [2]. This erosion is primarily induced by the turbulent flow around the ship, resulting from its movement, propulsion system, and the waves it generates.

In this invited session, attendees will have the opportunity to explore novel ideas, innovative concepts and developments regarding the study of the mutual interaction between vessels and inland waterways. Using in-situ, experimental, and numerical investigation and methods, the session aims to characterize the flow around vessels and examine the impact of navigation on sediment suspension and bank erosion, including convoy navigation concept.

REFERENCES

- [1] Caplier C., Gomit G., Rousseaux G., Calluau D., Chatellier L., David L. *Calibrating and measuring wakes and drag forces of inland vessels in confined water in a towing tank*. Ocean Engineering, Volume 186, (2019-a), Article 106134.
- [2] Osborne P.D., Boak E.H. *Sediment suspension and morphological response under vessel-generated wave groups: Torpedo Bay, Auckland, New Zealand*. Journal of Coastal Research 15(2), (1999), pages : 388-398.