

# ICCES 2023

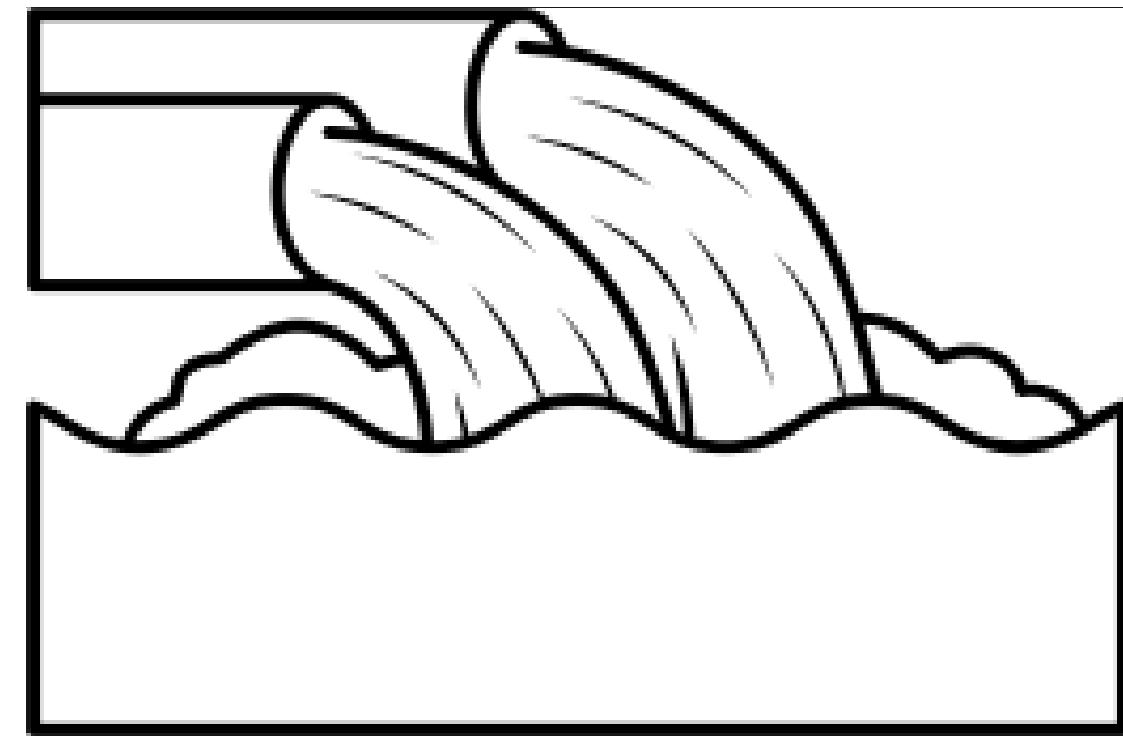
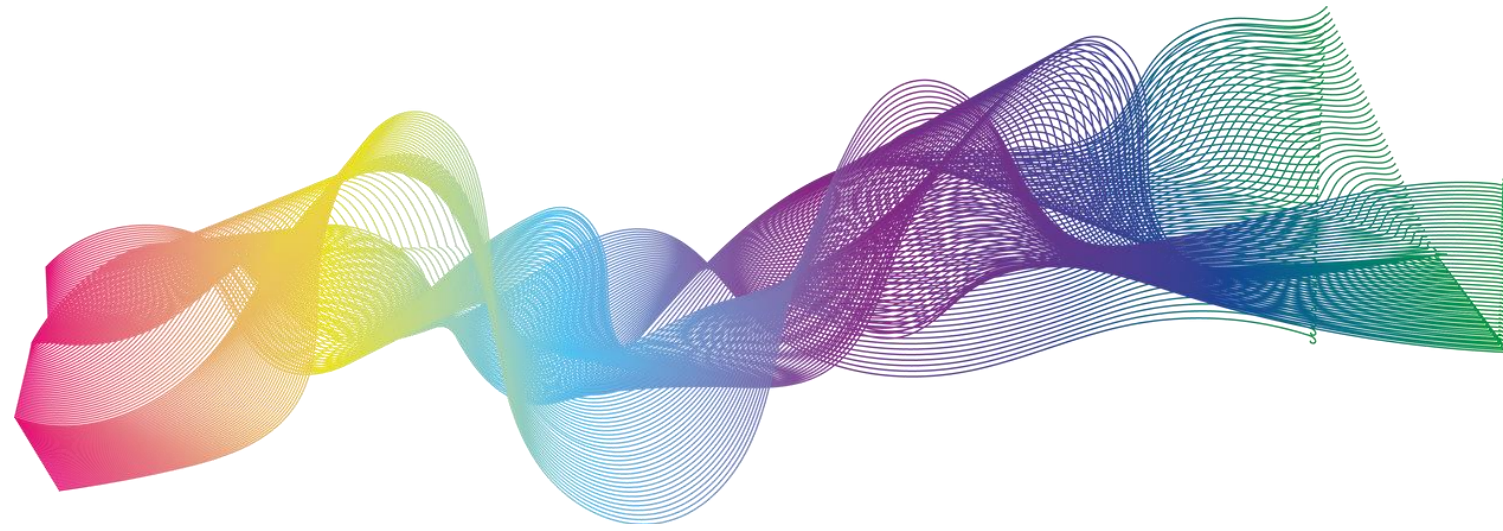
**15th August**

**International Islamic University Malaysia**

Title: Field enhanced sedimentation operations for solid-liquid separation in water treatment: *A review*

Presenter: **Amina Tahreen**

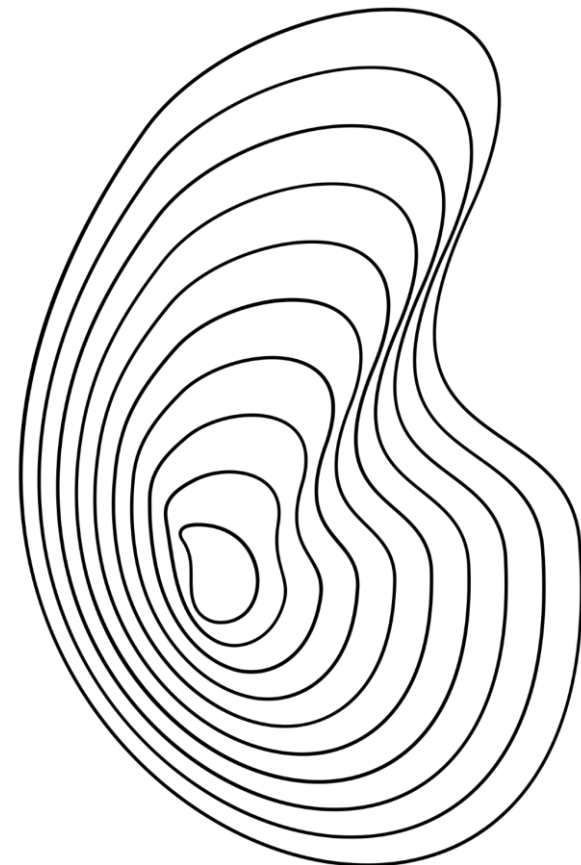
Co-Authors: Prof. Mohammed Saedi Jami,  
Prof. Masashi Iwata



# Field enhanced **solid-liquid** **separation**

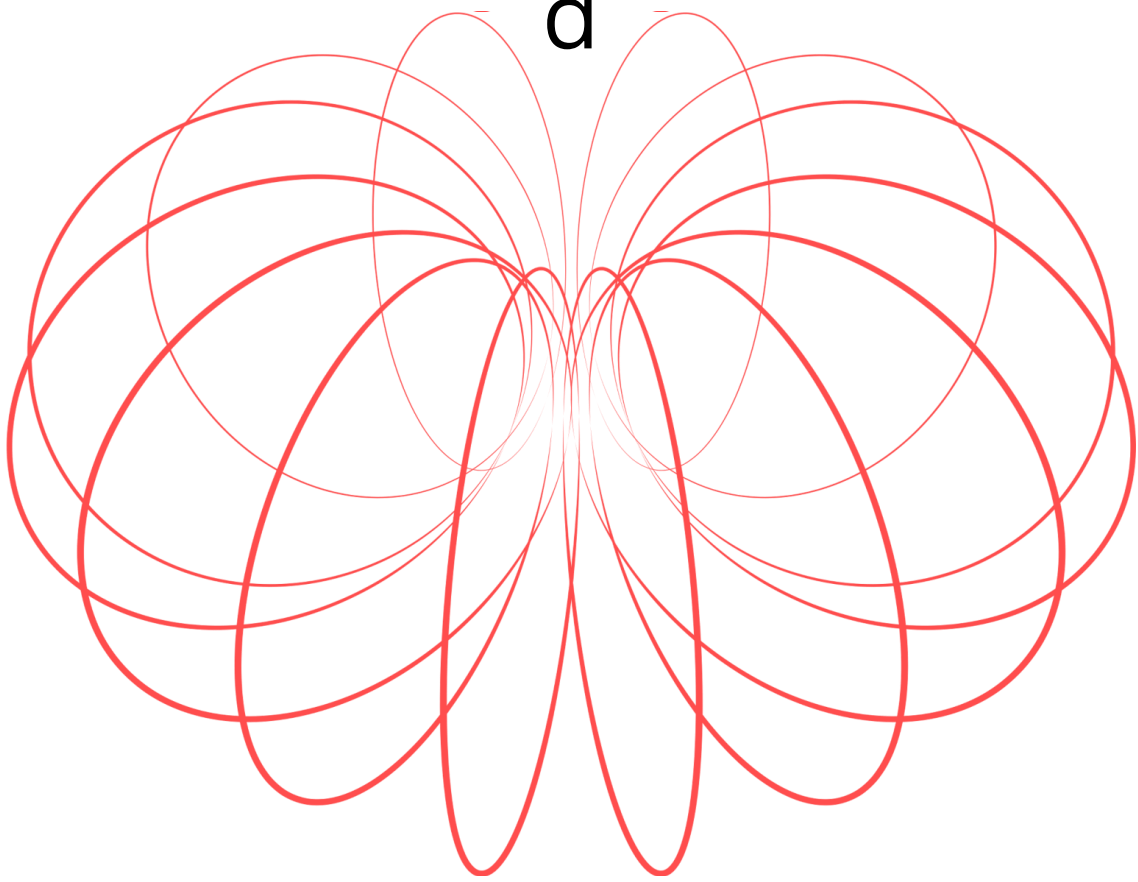


**Field**

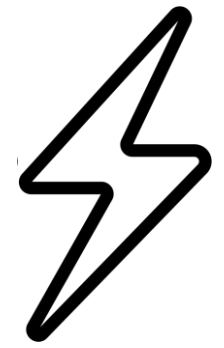


**Gravity**

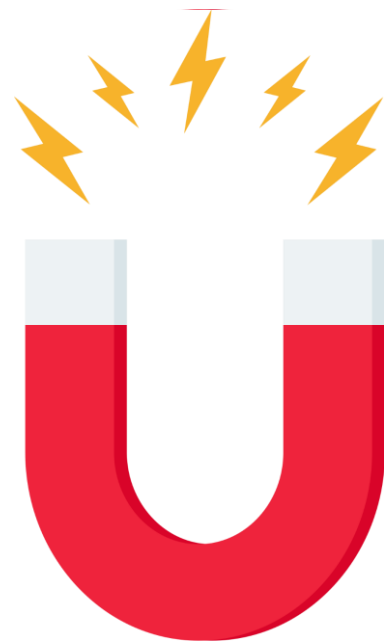
Sound



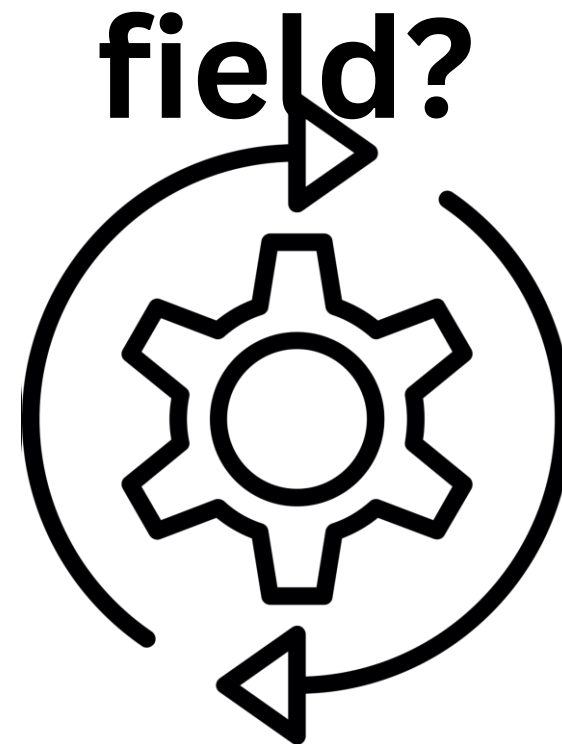
Renewable  
dewatering aid



**How to influence the  
field?**



Magnetic



Mechanical force



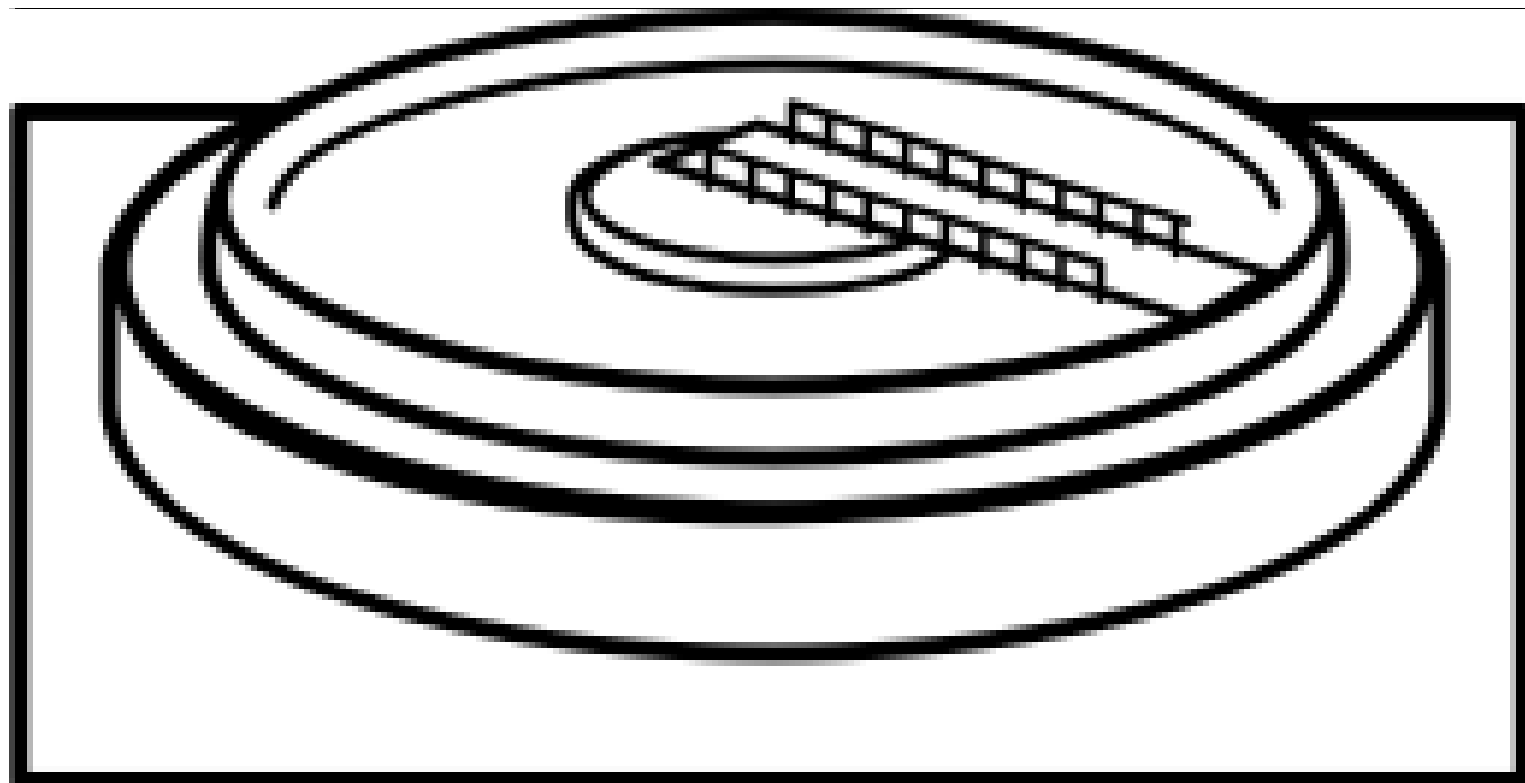
Electrochemical  
force



**To enhance sludge  
dewatering  
Help reduce the landfill waste  
Minimize harmful byproducts**

## **Motivation?**

**Reduce the cost of waste  
transportation by enhanced  
dewatering**



## Chemical dewatering aids

Cationic nanocelluloses (Suopajarvi et al. 2017)

Polymeric ferric sulfate (PFS) and chitosan (CTS) (Wang et al. 2019)

Cellulose filter aid (Shi et al. 2020)

Montmorillonite (MMT) supported nano calcium oxide (Wu et al. 2017)

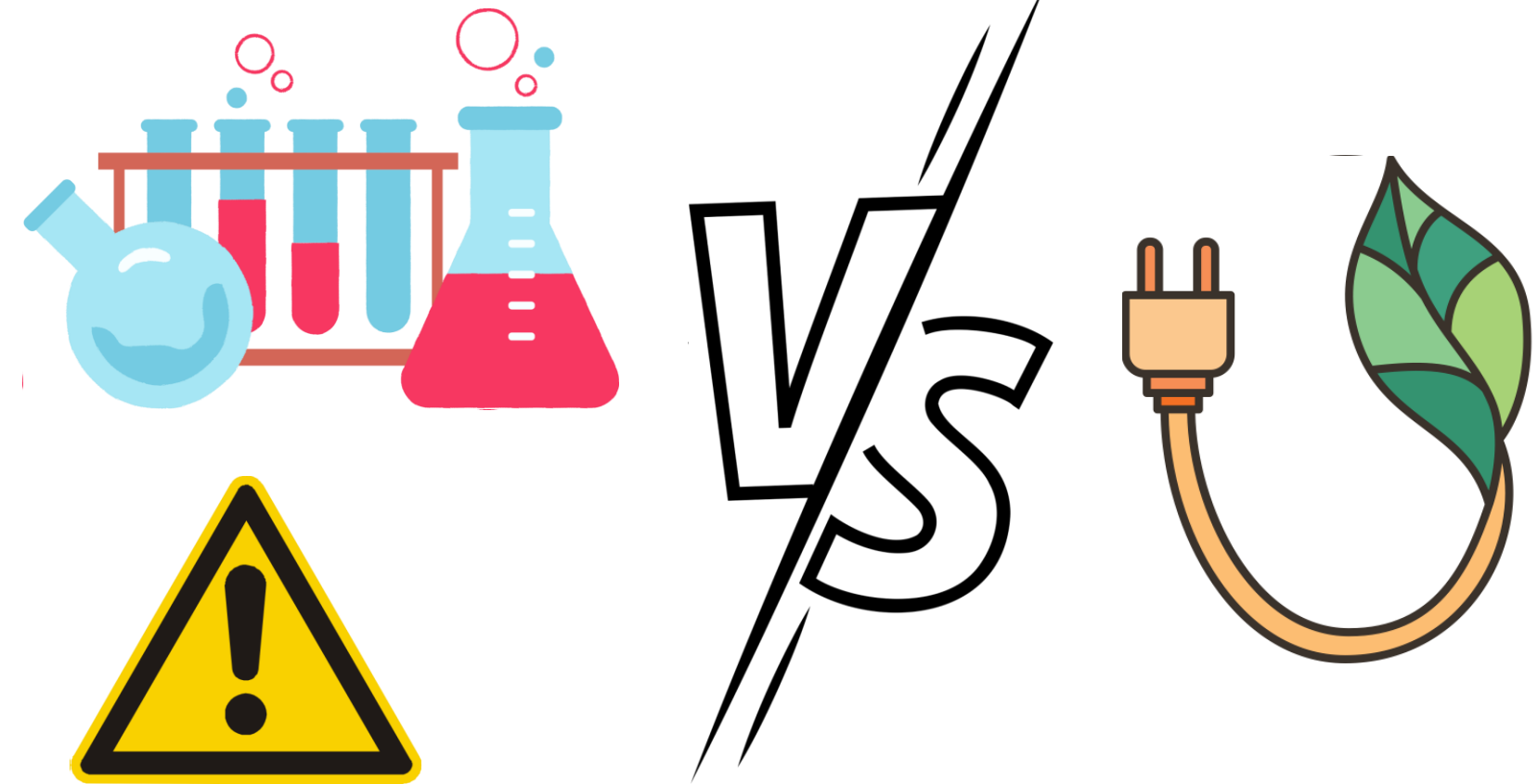
Thermal-acidic modified kaolin (TAMK) (Masihi et al. 2020)

Multifunctional porous graphene (Ito et al. 2019)

Calcium peroxide (Xu et al. 2020)

Acid-modified bentonite (Masihi et al. 2020)

Alum sludge (Ren et al. 2020)



## Renewable green dewatering aid

Rice husk powders (Wang et al. 2020)

Green conditioners (Chitosan hydrochloride, lysozyme) (Lin et al. 2019)

Corn-core powder (Guo et al. 2021)

Biofloculant (Moringa Oleifera) (Jami et al. 2018)

# *Moringa Oleifera*



Highly sought for medicinal properties, low-cost natural coagulant for water/wastewater treatment



Fast growing tropical tree  
Indigenous to parts of South Asia  
and Africa

phytochemical/bioactive compounds

# Conclusion

Chemical conditioners employed in typical dewatering pose threats to human health and the environment.

Although the adverse effects of chemical-based dewatering can be overcome by electro-dewatering effectively

Utilizing natural sources, such as *Moringa Oleifera* seed extracts as dewatering aids, can make the existing established electrokinetic sedimentation processes more sustainable and energy efficient, by effectively modifying the sludge properties

# References

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**Thank you**

**[aminatahreen@gmail.com](mailto:aminatahreen@gmail.com)**