18/01/2026

* Installed Zotero → Reference manager

20/01/2026

Required;

① distilled literature evidence table.

② turbulence scale target (ε)

③ Design configurations.

④ clear concept selection plan.

Evidence table (min. 10-12 papers)

Define limnological turbulence scale target (ε).

Summary on,

→ Turbulence intensity quantified by ε

→ Typical limnological ε spans orders of magnitude.

→ Proposed design target : adjustable ε range.

Create 3 concept configurations + selection matrix

1. Oscillating grid
2. Jet array / perforated pipe manifold
3. Paddle / flapping grid / moving rods

→ sketch

→ Pros / cons → 3 each

concept selection matrix.

1. Turbulence quality (low mean flow)
2. controllability
3. fabrication feasibility.
4. installation in flume.
5. Safety.

why? → low mean flow generation (compared to impellers)
→ controllability (frequency / stroke)
→ relatively homogeneous turbulence region
→ strong literature base for ε & turbulence statistics.
→ most common reference
→ standard used in biological / limnological turbulence work.

Method landscape

quantitative selection

1. Oscillating grid
2. impeller / stirred tank (rotating propeller)
3. jet array / multi-jet injection.
4. Rotating discs / rotating cylinders
5. Paddle / flapping grid / moving rods
6. Active grid (wind tunnel style, if applicable)
7. Roughness elements / baffles (passive)

fill, → qualitative selection.

→ how turbulence is generated
→ turbulence nature (isotropic? mean flow?)
→ controllability
→ suitability for flume.
→ Typical validation matrices

## Why oscillating grid?

For limnological studies, the turbulence generators should ideally provide,

1. High turbulence intensity with minimal mean flow (avoid stray bulk currents)

2. Repeatability & controllability (tunable turbulence)

3. Uniform turbulence region in a defined test section.

4. Low shear "hot spots" near moving parts (organism safety / experimental integrity)

5. Compact & mountable in a flume.

6. Simple validation using standard turbulence metrics ($\varepsilon$, $u'$, etc.)

7. Mechanical feasibility (fabrication + maintenance).

22/01/2026

→ Ongoing week ⟶ 7th week.

* phase 1 → (1-7) weeks
Literature review
+
identification of turbulence scales

* phase 2 → (5-8) weeks
conceptual design
+
Selection of turbulence generator configuration.

Questions :-

→ daphnia
↗ fresh water zooplankton

Oscillation grid turbulence →

Zooplankton → (copepods)

↓

$10^{-7}$ to $10^{-3}\ m^2 s^{-3}$

→ Back calculation → disc speed.

Assumption → disc size,

KE per mass → $m^2/s^2$

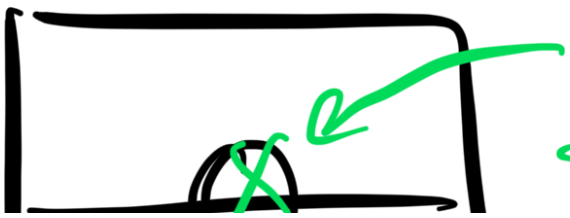
dissipation rate (per time) → $m^2/s^3$
(ε)

→ Simulation → Ansys.

↳ 2/3 meters tank.

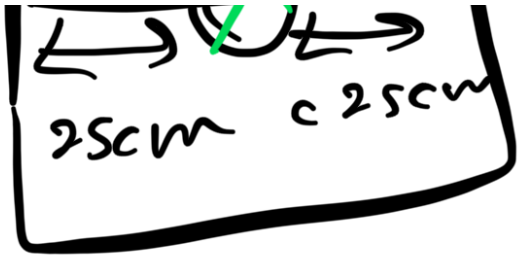
↷ 2D

50cm → 55cm.



find

* field of view




dissipation rate at the center.