

Static and dynamic bending of fuel rods of the NEPTUN reactor

Maxim Podlesnyy

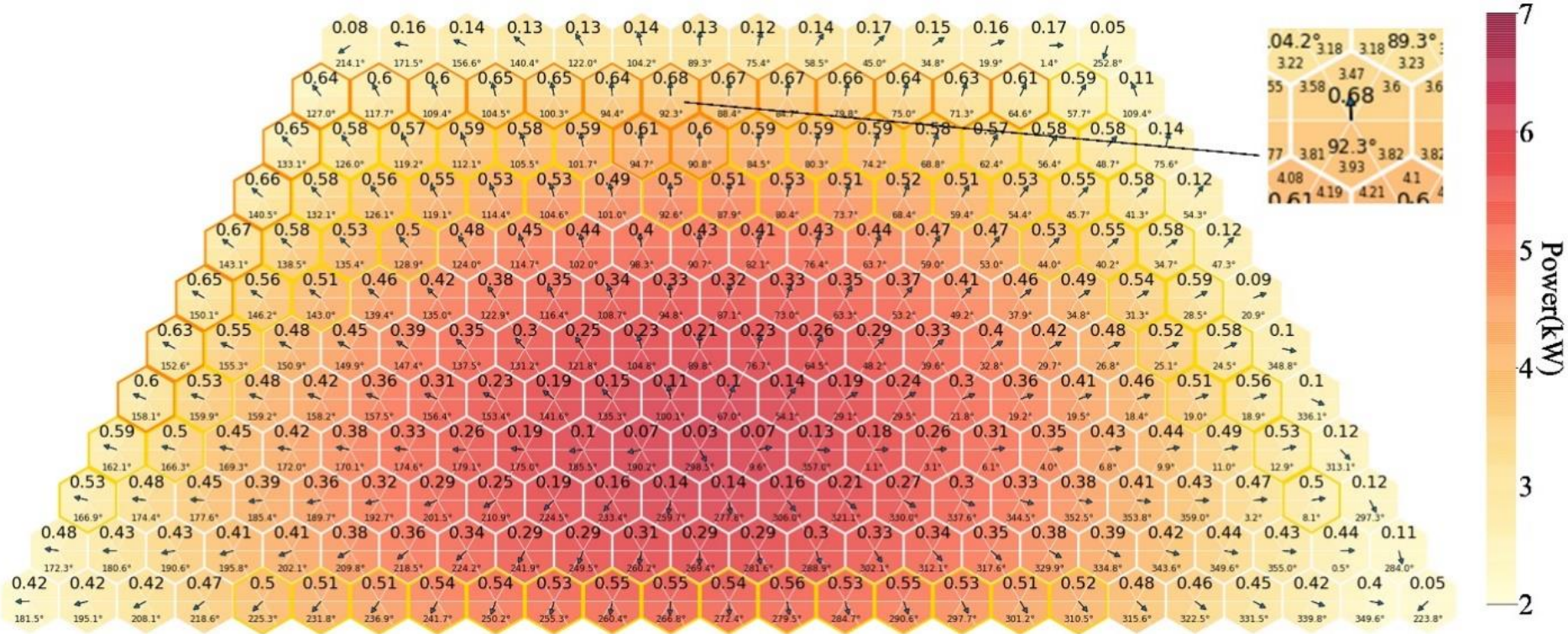


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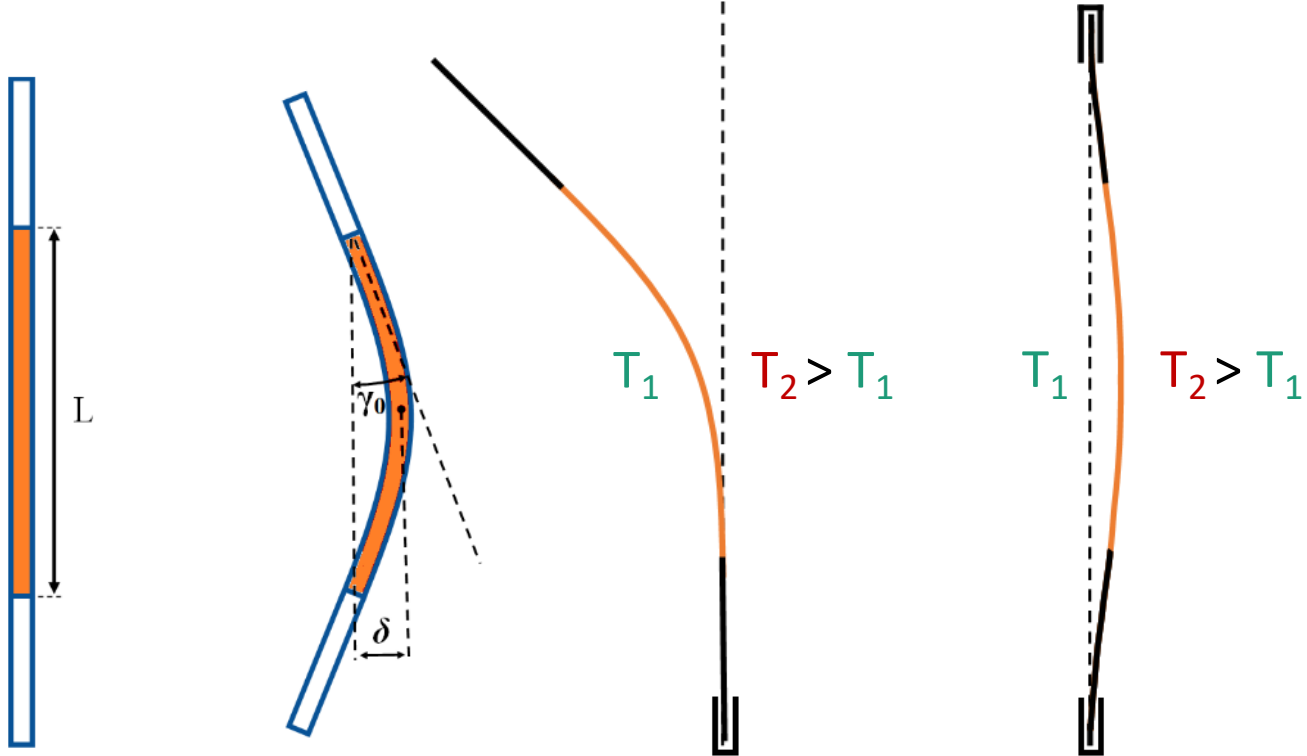


Energy release in fuel rods

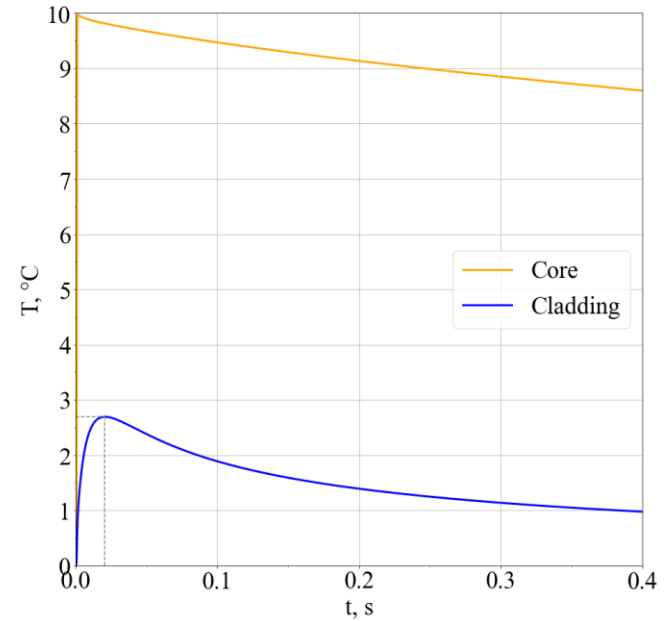
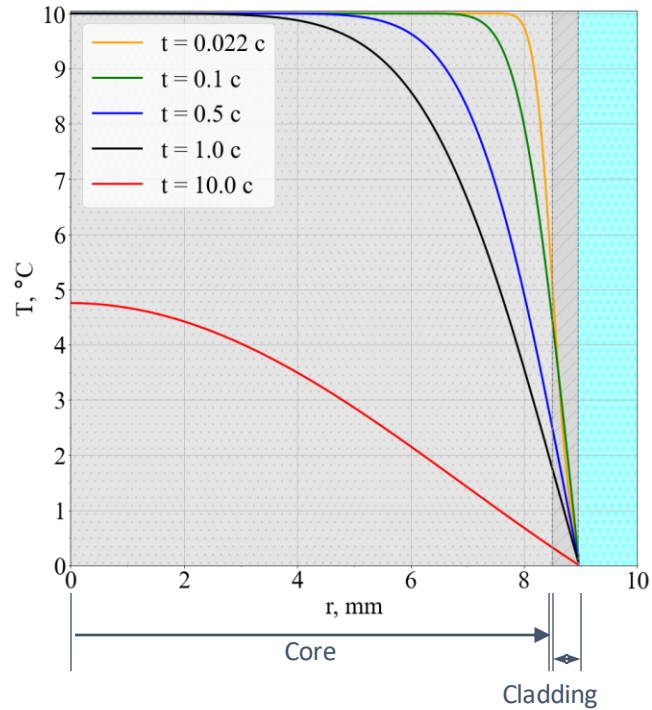


Static deformation

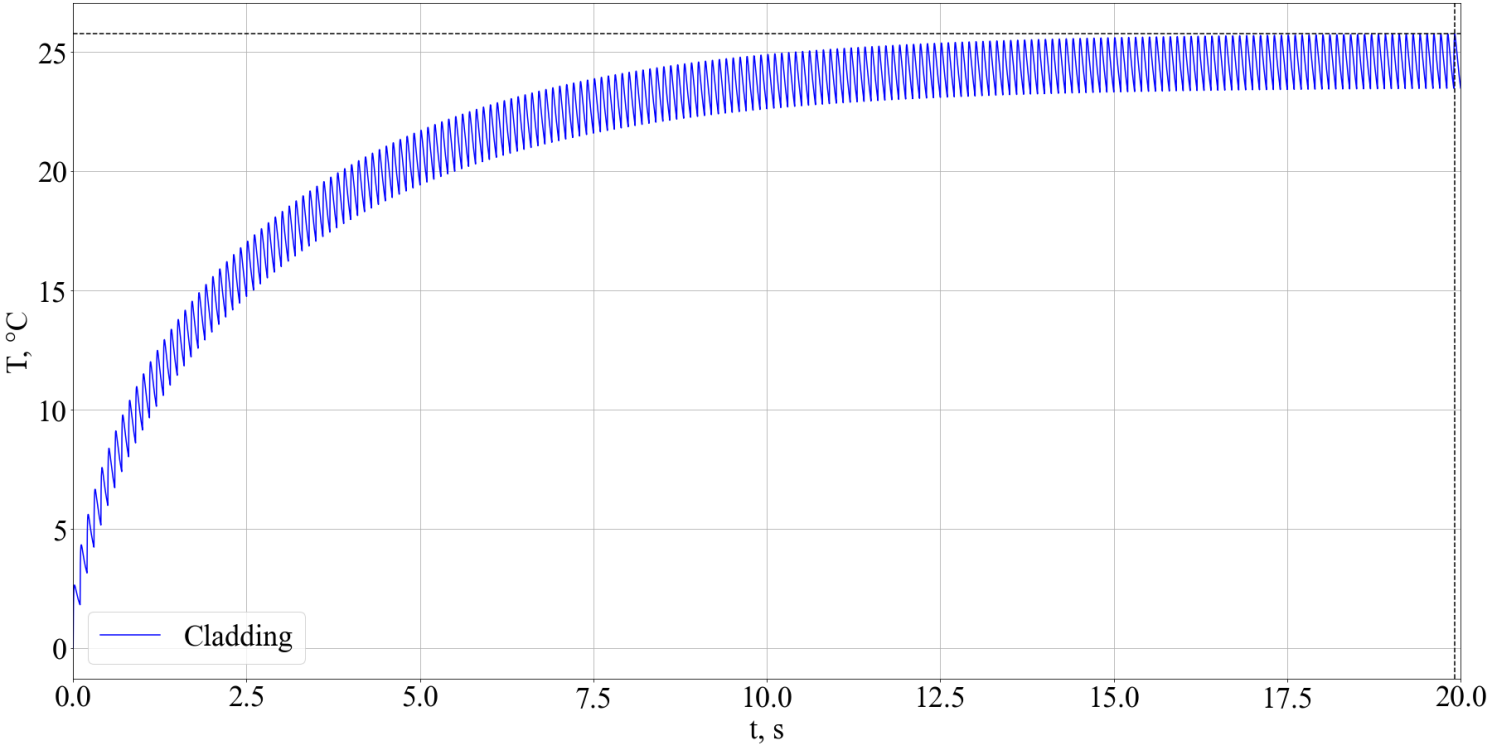
$$\Delta l = l_1 \alpha \Delta T$$
$$E \cdot I \cdot \ddot{y} = M \sim \Delta T$$



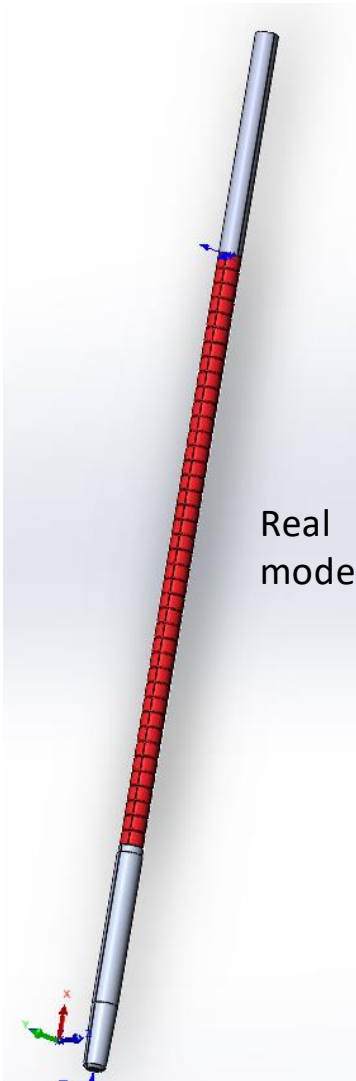
Temperature distribution for one pulse



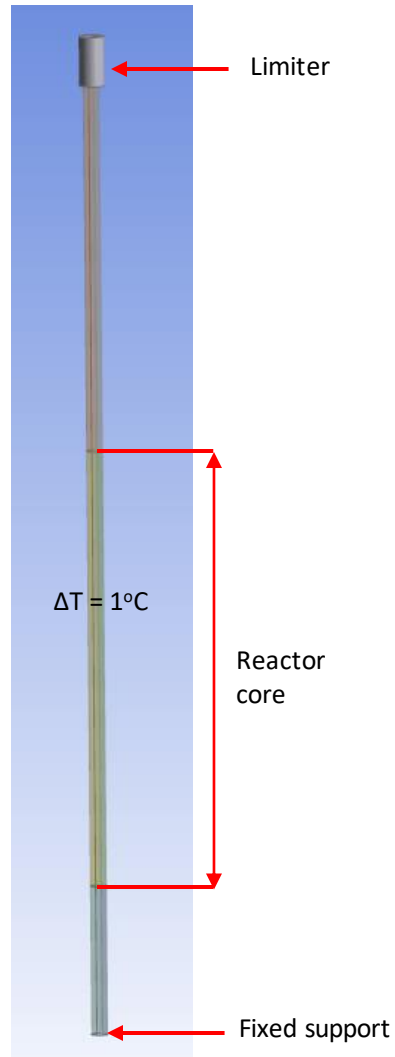
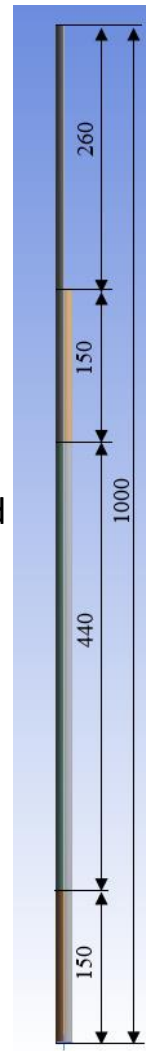
Cladding temperature dependence for successive pulses with a frequency of 10 Hz



Fuel rod model

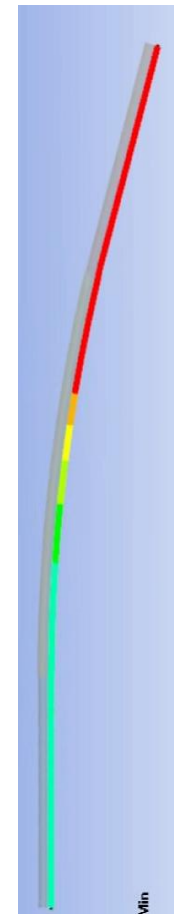
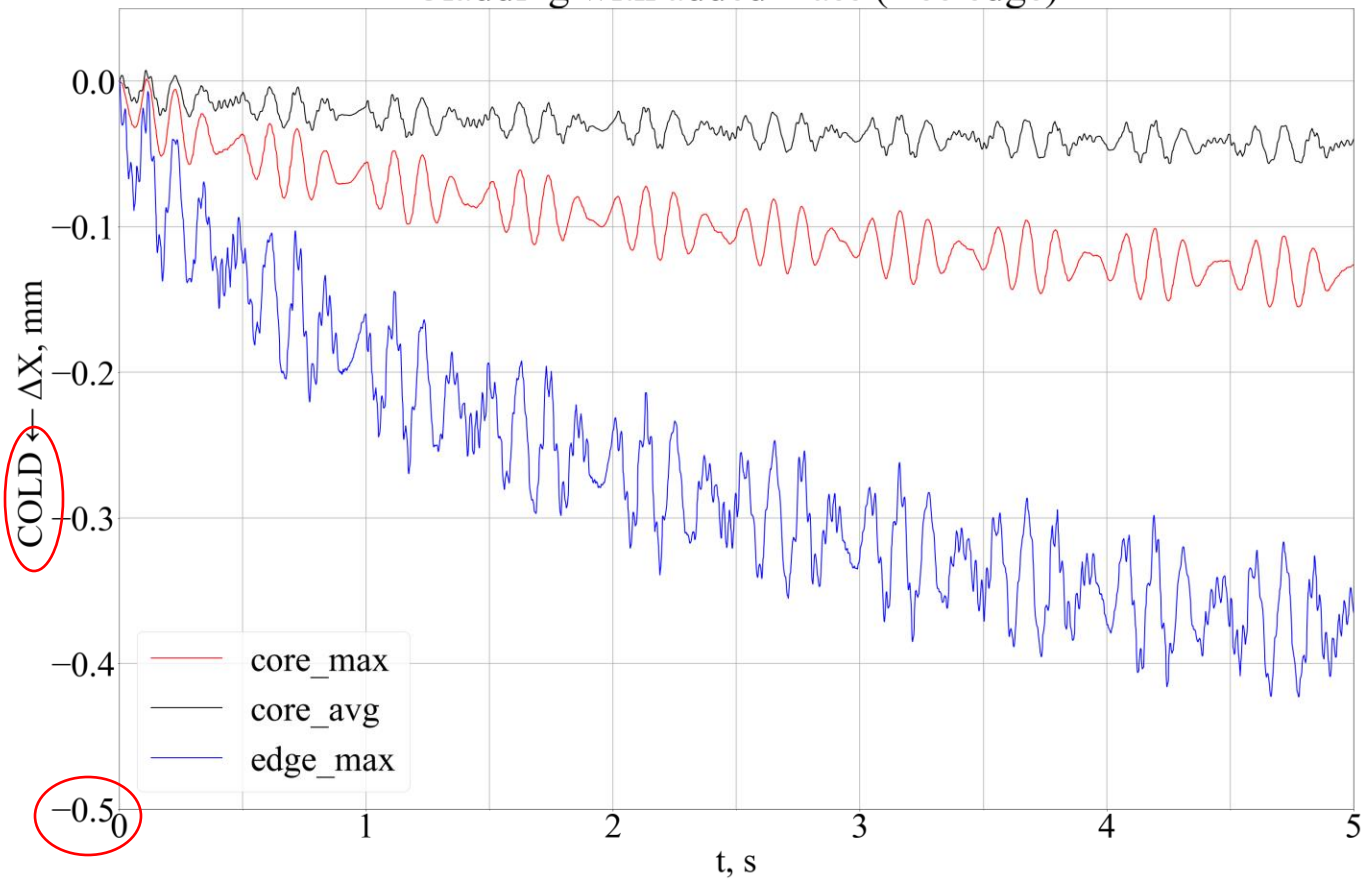


simplified model



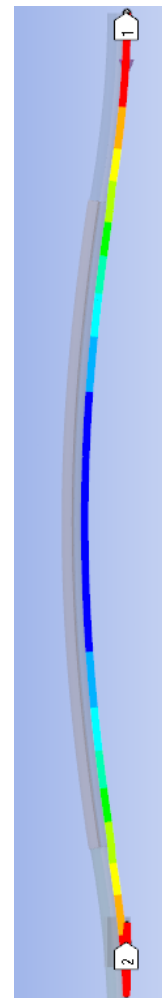
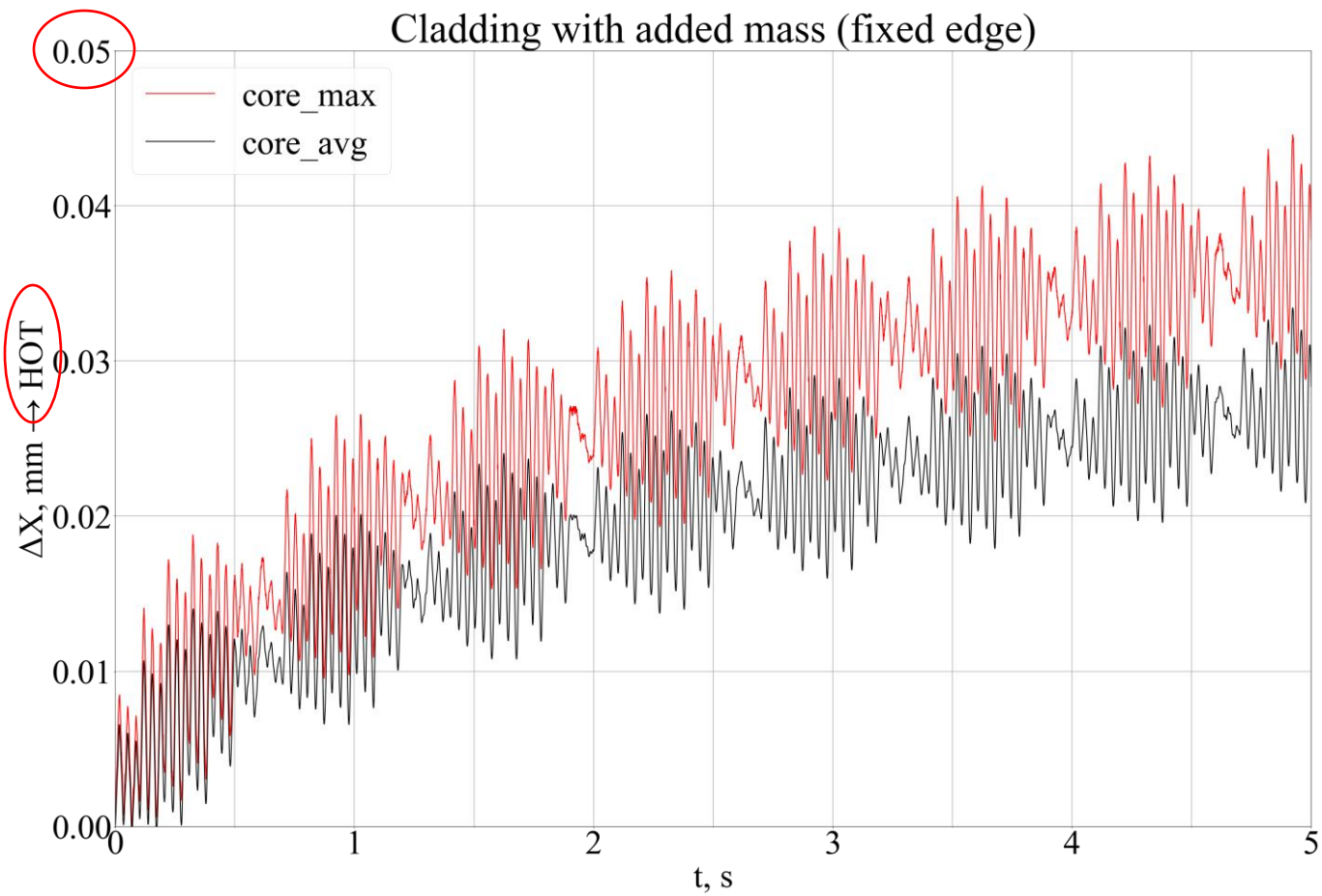
Free edge

Cladding with added mass (free edge)



Fixed edge

Cladding with added mass (fixed edge)



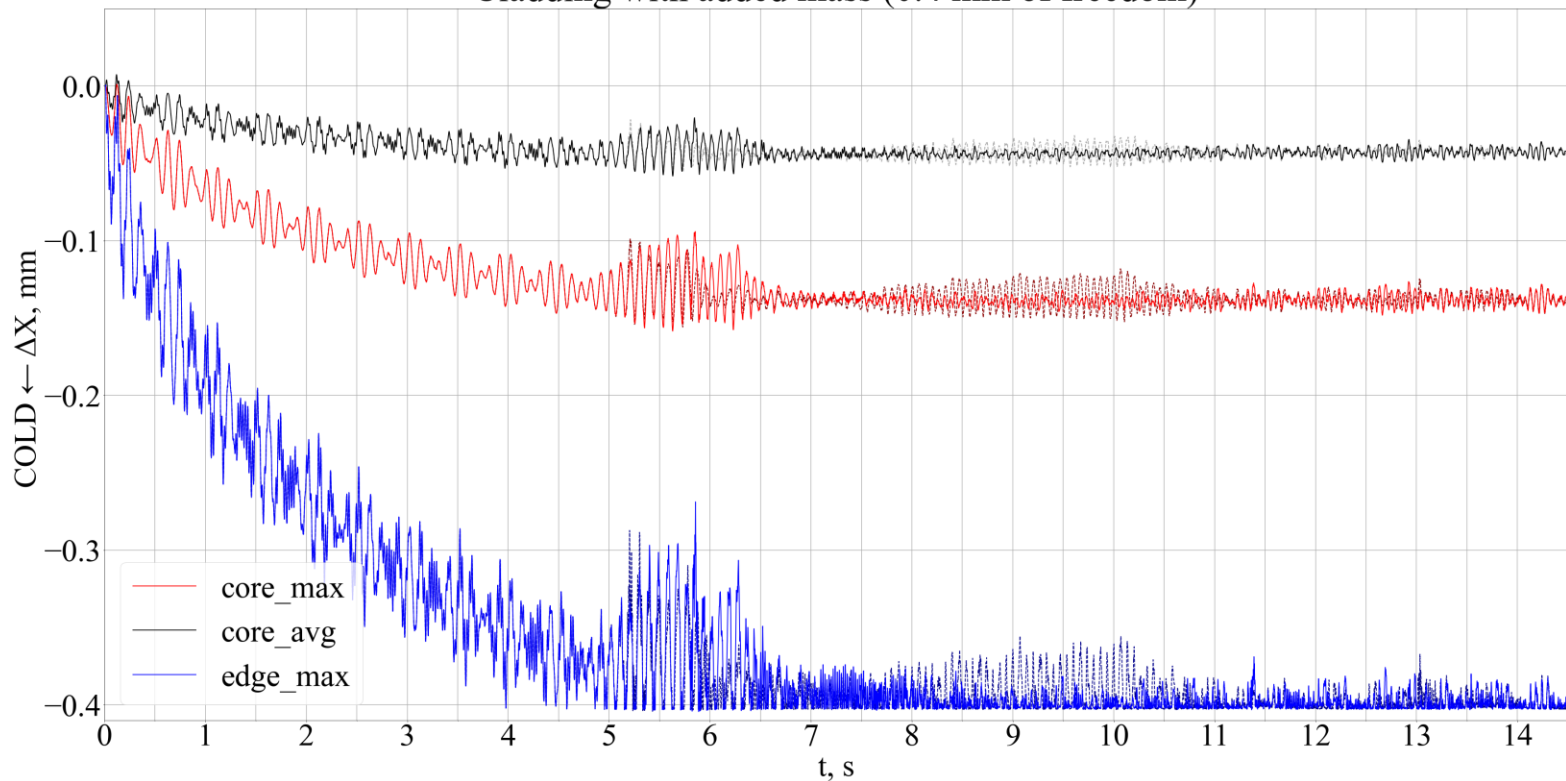
Limited lateral displacement of edge

Energy dissipation = $1e-4$

- No friction with limiter

-- $\mu = 0.18$

Cladding with added mass (0.4 mm of freedom)



Further research

- Frequency response → evaluation of the stability
- Improving model → conducting a real experiment

Thank you for your attention!



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"Dark" matter

