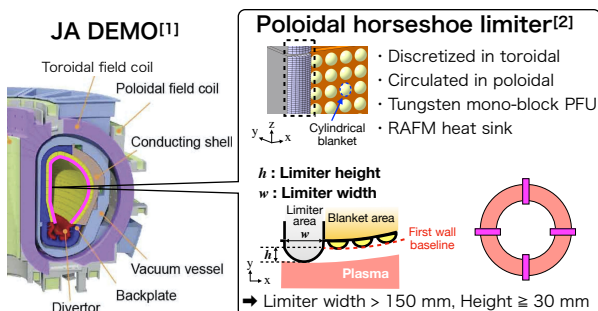


Structure Design of Poloidal Horseshoe Limiter for Pulse Operation Heat Load in JA DEMO

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Overview



Pulse operation is anticipated to be implemented during the initial phase of JA DEMO operation^[3]
→ **Cyclic thermal stress caused by the heat load deposited on limiter lead to thermal fatigue and possibly dominates the lifespan of the limiter**

Objective

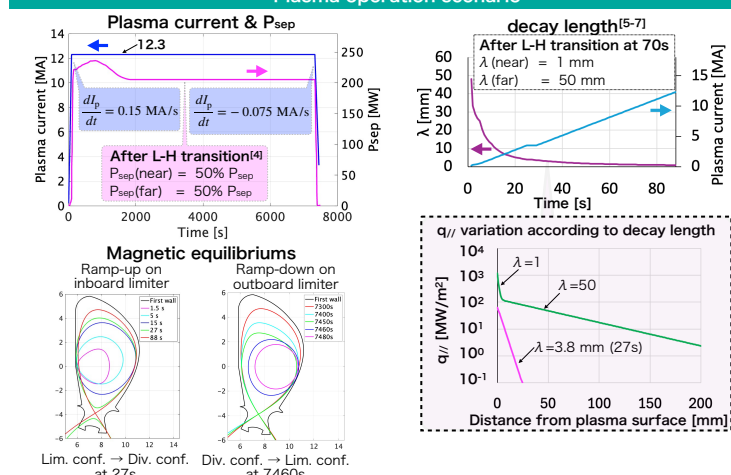
- Evaluate the **heat load during pulse operation**
- Evaluate the **thermal stress in the PFU** of the limiter and propose an improvement for PFU design

Achievement

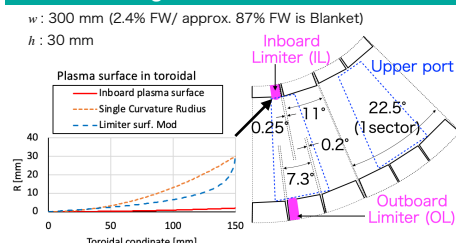
- The highest heat load on limiter is **2.8MW/m² at ramp-up phase**, **2.4MW/m² at flat-top phase**
- PFU with **copper interlayer** depicts **high and critical stress on F82H pipe**
- PFU with **titanium interlayer** absorbs the thermal stress and lowers F82H pipe's stress

Heat load on limiter during pulse operation

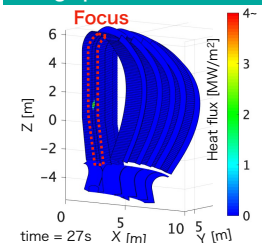
Plasma operation scenario



Design of limiter surface^[8]

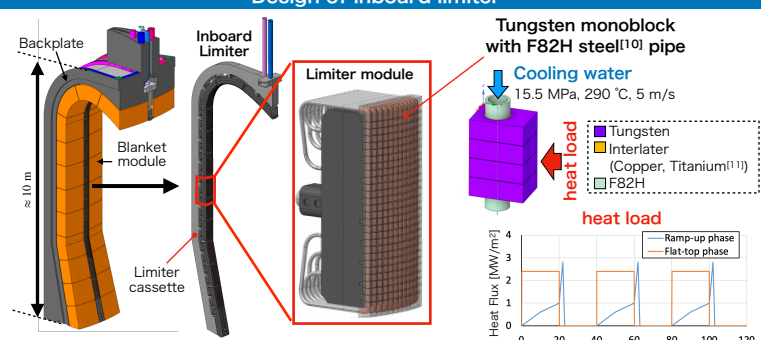


Charge particle heat load^[9]

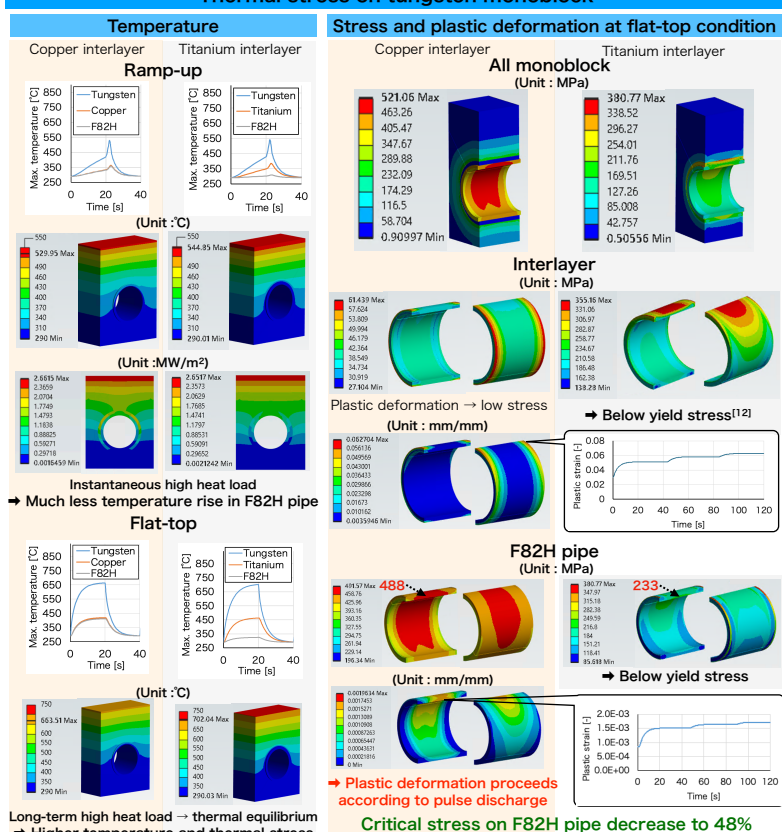


Thermal stress analysis for plasma facing unit

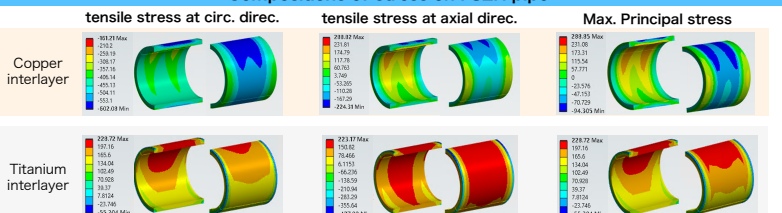
Design of inboard limiter



Thermal stress on tungsten monoblock



Compositions of stress on F82H pipe



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