Functionality Enhancement through Design and Development of Advanced Finite Element Algorithms for STR TOOLS– SERB and VSSC, ISRO

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Theme: Enhancing the functionality of FEAST^{SMT} indigenous "made-in-India" FEM software currently developed by VSSC,

Objective: To develop advance algorithms to enhance the currently capability of FEAST^{SMT} through four modules
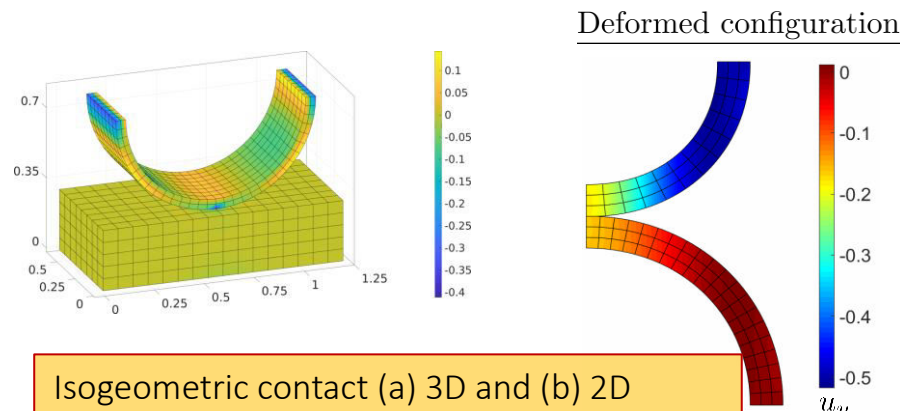
- Isogeometric contact module – To add IGA and contact capability with in the FEAST^{SMT} framework
- Acoustics module – To add acoustics capability in FEAST^{SMT} through a Novel OWF formulation in harmonic exterior analysis
- Hyperelasticity module – To add a number of hyperelastic material models in FEAST^{SMT}
- Operational Modal Analysis module – To incorporate OMA module for input-output data and output only data in in FEAST^{SMT}

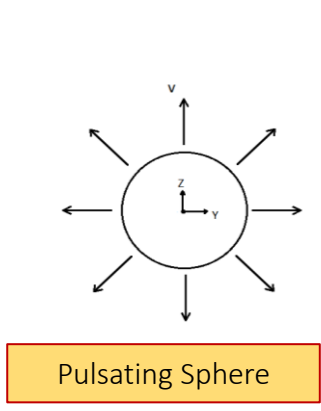**Deliverables:** Algorithms and/or Python enabled interface to be directly integrated with FEAST^{SMT}

❖ **Outcome through Project:** A enhanced version of FEAST^{SMT} FEM software with potential to further reduced dependability on foreign FE software. Currently a number of high quality research publications have been published.

❖ **Societal Impact:** Available to academic institutions at a very reasonable rate saving precious foreign currency and self-reliance towards FE software in India. It will also enable training of manpower in advanced FE technologies

❖ **Current Status:** The work on modules has been more than 50% complete and expected to be complete 100% by 2022 Dec.
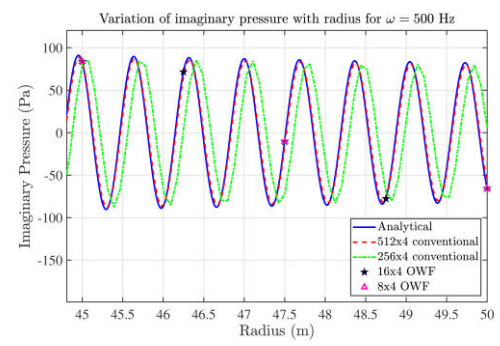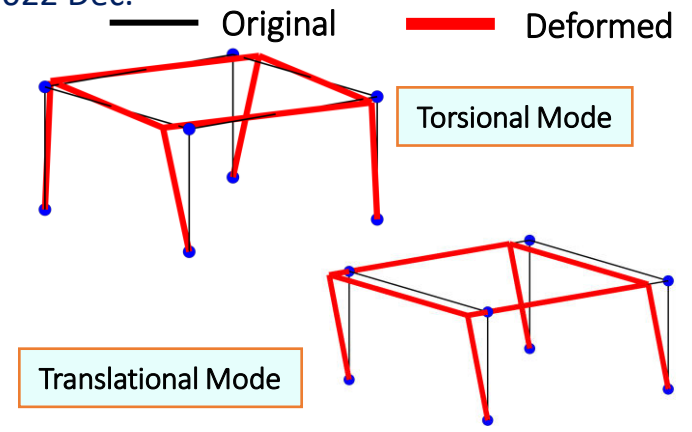

$E = 1000$
$\nu = 0.25$
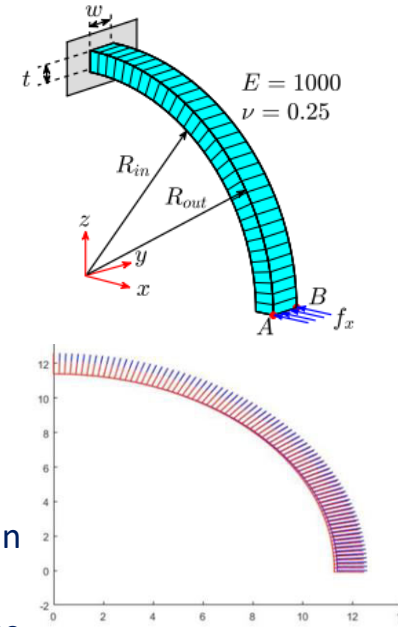
A curved cantilever beam problem,

Original Deformed

Torsional Mode

Translational Mode

Deformed configuration

Isogeometric contact (a) 3D and (b) 2D

Pulsating Sphere

Variation of imaginary pressure with radius for $\omega = 500$ Hz

Far field Imaginary Pressure