

Problem

Computer-aided-engineering (CAE) software applies the Finite Element Method (FEM) to capture the macroscopic stress-strain response

CAE with FEM has received widespread acceptance for structural analysis of medical devices including stents, heart valves and orthopedic implants

Significant challenges persist for FEM in modeling of complex phenomena in medical devices comprised of materials with 3-D mesostructural discontinuities and heterogeneities such as mechanisms of fracture activation in advanced stents

Solution: MesoEqs™

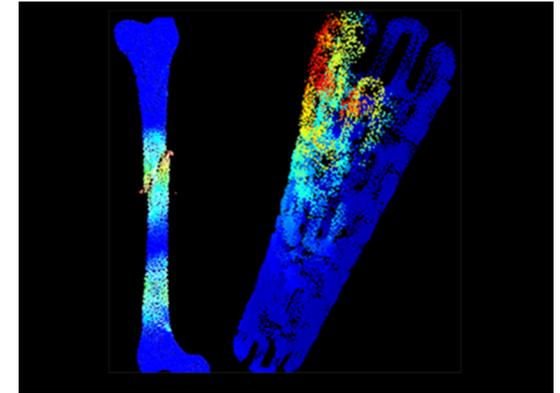
Sunergolab Inc. in collaboration with academic partners has developed, for the first time, practical peridynamic software MesoEqs™ for material damage and failure predictions

MesoEqs™ applies Peridynamics, a new theory that unifies the mechanics of continuous media, cracks, and discrete particles

MesoEqs™ is based on equations which are valid everywhere, including discontinuities

MesoEqs™ does not need an external criterion for crack initiation and propagation

MesoEqs™ discards requirements on mesh size in damage models



PRACTICAL PERIDYNAMIC SOFTWARE FOR DAMAGE & FAILURE PREDICTIONS

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Product

- ✓ FEM license packaged with the peridynamics software
- ✓ The best of Peridynamic and traditional Finite Element Methods
- ✓ Optional remote access and a Pay-as-you-go license
- ✓ 24/7 Unique expert support

Customers

MesoEqs™ base customers are designers and manufacturers of advanced medical devices such as stents, heart valves and orthopedic implants

Market

MesoEqs™ target market is the portion of \$2B market of medical devices comprised of materials with 3-D heterogeneities and discontinuities (e.g., porous metals/alloys, composites)

MesoEqs™ key benefits

- ✓ Predictive mechanics of engineering material

MesoEqs™ can predict mechanics of complex material with 3-D mesostructural discontinuities and heterogeneities

Existing FEM software must deal with ambiguity of derivatives of displacement at discontinuities

MesoEqs™ can naturally manage large deformation gradients and incorporate damage models unconstrained by mesh size

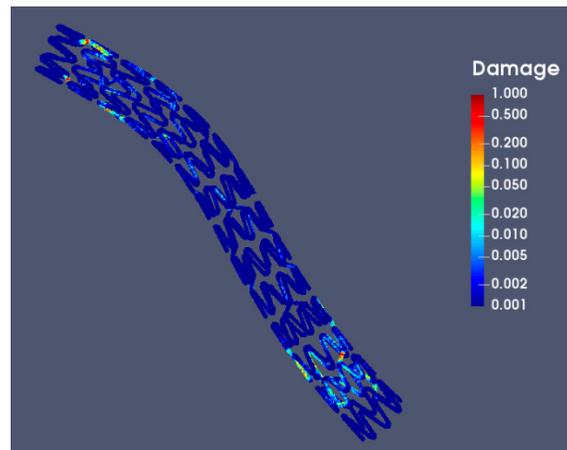
Damage models in existing FEM software typically impose requirements on mesh size

- ✓ The best of FEM and Peridynamics

MesoEqs™ software can provide the best of both worlds: the peridynamic model is applied in regions susceptible to material failure, while the FEM model is applied elsewhere

- ✓ Unique expert support

Sunergolab Inc. works in partnership with primary developer of the MesoEqs™ peridynamic solver and primary initiator of peridynamic method



This stent geometry is a courtesy of Prof. N. W. Bressloff

These benefits deliver value to customer by

- ✓ Accelerating the development of advanced medical devices comprised of material and components with damage tolerance exceeding those of existing prototypes
- ✓ Complementing laboratory testing with predictive analysis
- ✓ Providing insight to damage processes at disparate scales

Partners

SunergoLab is seeking industry partners for

- Fully-integrated demonstrations of MesoEqs™ in close collaboration with a partner for its relevant application
- Integration of MesoEqs™ with partner's CAE code
- IP generation for designing new materials and manufacturing processes

Further development and validation can also be funded through Small Business Innovation Research (SBIR) and Broad Agency Announcement (BAA) Programs

SunergoLab Inc.

Sunergo is translated from Greek as “work together”. Sunergolab Inc. teams with academia/national laboratories (e.g., Sandia National Laboratories) to enable the use of mesoscale predictive software in forward-thinking materials applications. The SunergoLab team has 50+ years working in field of CAE and 20+ years of managerial experience. The team also leverages the expertise of Dr. David Littlewood (the primary Peridigm developer) and Dr. Stewart Silling (the initiator of Peridynamics).



SunergoLab
working together

Learn more at www.sunergolab.com