Module
elasticity

Module elasticity{
  name = *somename*
  regions = *set_of_regions*
   ...

Physics
 { *somemodel* { } }

Contact *somecontact*
{type = *bc_model*}
}

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Physical models

External force applied to the device

Elastic constant model

Models implemented:

- body_force
  - *constant*
  - *converse_piezo*
  - *lattice_mismatch*
  - *thermal_stress*
- Stiffness
  - *Isotropic*
  - *Anisotropic*

```
body_force constant
{
  F = N/m^2
}
```

Strain induced by **lattice mismatch** can be mapped in a *body force*

$$f_i = -\frac{\partial}{\partial x_j} C_{ijlk} \epsilon_{lk}^{LM}$$

```
body_force lattice_mismatch
{
  reference_material = mat
  structure = cryst_struct
  x_growth-direction = ….
  …
}
```

Physical models

```
body_force converse_piezo
{
  poisson_simulation = dd_sim
}
```

simulation providing the electric field strength

$$\sigma_{il}^{SC} = -e_{ijk}E_k$$

```
body_force thermal_stress
{
 [thermal_coefficient = ]
 thermal_simulation = my_term
}
```

Mechanical stress due to temperature gradient

$$\epsilon_{ij} = \alpha_{ij}(T - T_0)$$

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Boundary conditions

Implemented models:

- Surface force
- Clamp
- Custom

```
Contact  base{
 type  = Surface force
 force = applied force in  GPa}
```

```
Contact  substrate{
 type  = clamp
   }
```

To fix all the nodes of a given surface region of the device