Adventures with SciRuby

16 September, 2014

Michael O'Sullivan

SciRuby Gems

- Visualization
  - rubyvis, plotrb
- Statistics
  - statsample, distribution
- Numeric
  - minimization, integration, nmatrix

NMatrix

```
>> require 'nmatrix'
=> true

>> n = NMatrix.new( [2, 4], 0)
[
 [0, 0, 0, 0]
 [0, 0, 0, 0]
]
=> nil

>> NMatrix.new( 3, 0)
[
 [0, 0, 0]
 [0, 0, 0]
 [0, 0, 0]
]
```

NMatrix: Multi-Dimensional

```
>> NMatrix.new( [2, 3, 3], 0)
[
 [0, 0, 0]
 [0, 0, 0]
]

[
 [0, 0, 0]
 [0, 0, 0]
]

[
 [0, 0, 0]
 [0, 0, 0]
]
```

Water/Oil Emulsion Stability with Electrolytes

$\geq$ 20 mM electrolyte:

- decreased coarsening rate
- inhibited coalescence during freeze-thaw processing
- hypothesized salt enhanced surfactant adsorption density

Aronson and Petko, *J. Colloid and Interface Sci.*,(1993), 159:134–149

Ostwald Ripening

NaCl solutions dispersed in mineral oil

Koroleva and Yurtov *Colloid Journal*,(2003), 65(1):40–43

- $\leq$ 12 mM
  - mean droplet size increases
  - droplet number density decreases
- 12 mM $\leq$ 188 mM
  - droplet size redistribution occurs
  - constant droplet number density
- $>$ 188 mM
  - droplet size varies $<$ 1 % over time studied

$$\pi = \frac{nRT}{V}$$

$$p_{Lp} = \frac{2\gamma}{r}$$