

## A brief description of the PATRAN meshes to be used at the Summer School

1.

**1400h.pat** 1400nm pyramid, meshed at 38nm, 115,722 elements 21401 nodes.

Made for material constants

$A=0.76E-11$  (J/m)

$M_s=1.56E5$  A/m

$K_1=-1 E3$  J/m<sup>3</sup>

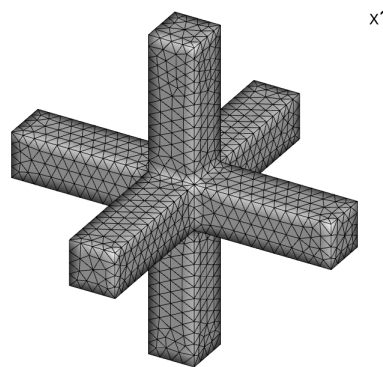
2.

**Cross\_Tauxe20nmb.pat**

3d cross like structure 20nm consisting of 3 orthogonal pipes of size

20nm x 20nm x 140nm meshed at ~ 5nm

Use magnetite 20 C



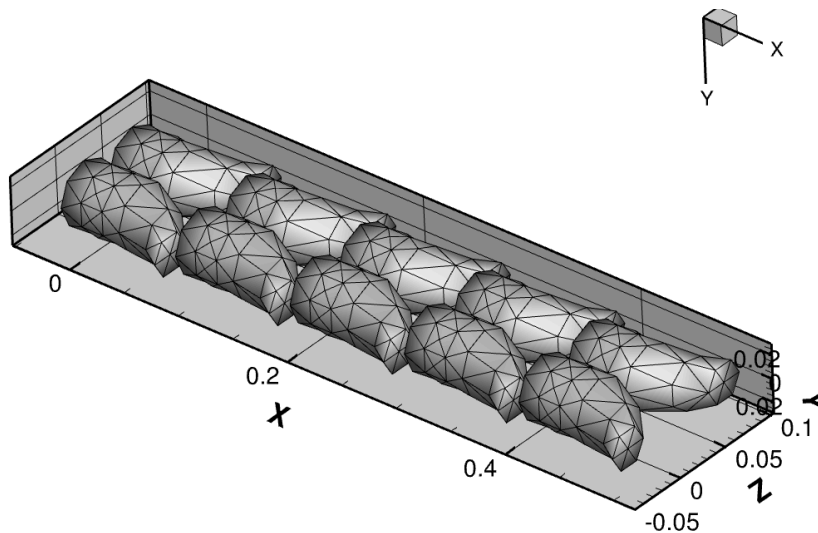
3.

Hook Magnetosome

**Hook\_magneto\_10x100nm.pat**

2 rows of 5 x hook shapes each one approx. 100nm long, 30nm radius, 10nm separation

Meshed at 8nm. Approx. 35900 elements total



4.

**sphere110nm\_x1.pat**: 1 x 110nm diameter sphere, meshed at 9nm  
11982 tets

2 or 3 or 5 x 110nm diameter sphere in a row along x, meshed at 9nm separated by 5nm

**sphere110nm\_x2.pat**

**sphere110nm\_x3.pat**

**sphere110nm\_x5.pat**

11982 tets in each sphere

5.

1 x 90nm diameter sphere meshed at 9nm **sphere90nm\_x1.pat**

11982 tets

3 or 5 or 7 x 90nm diameter sphere in a row along x, meshed at 9nm separated by 0.01nm

**sphere90nm\_x1.pat**

**sphere90nm\_x3.pat**

**sphere90nm\_x5.pat**

**sphere90nm\_x7.pat**

6.

7 x Cubes of side length 0.0725 nm (ESVD to 90nm) with separations between cubes of separation, 0.1nm, 5nm, 20nm, 145nm and 300nm

**brick725x7\_s0p1.pat**

**brick725x7\_s5.pat**

**brick725x7\_s20.pat**

**brick725x7\_s70.pat**

**brick725x7\_s145.pat**

**brick725x7\_s300.pat**

7.

10x 90nm diameter spheres equally dispersed (2,10,20,50,90,150nm separation) in a ring in xy plane. Circle radius given by  $2 \cdot \pi \cdot r = 10 \times (90\text{nm} + 2\text{nm}) = 0.14642255$  etc

**sphere90nm\_x10\_2\_circle.pat**

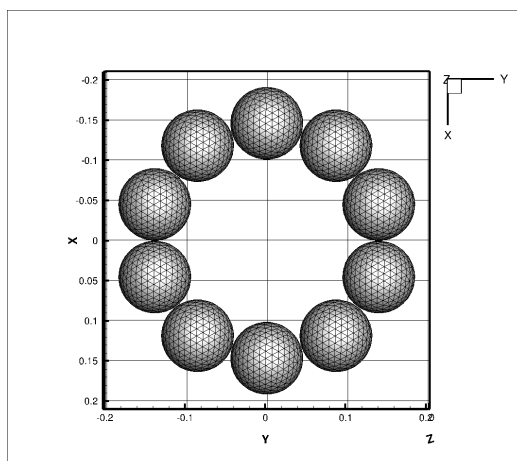
**sphere90nm\_x10\_10\_circle.pat**

**sphere90nm\_x10\_20\_circle.pat**

**sphere90nm\_x10\_50\_circle.pat**

**sphere90nm\_x10\_90\_circle.pat**

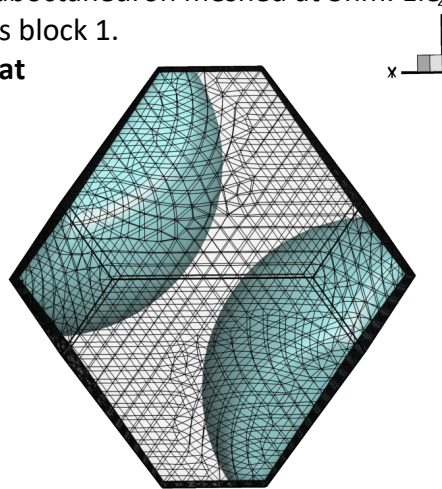
**sphere90nm\_x10\_2\_circle.pat**



8.

120nm 3-block cuboctahedron meshed at 3nm. Elements in blocks 2 and 3 are coloured blue. Elsewhere is block 1.

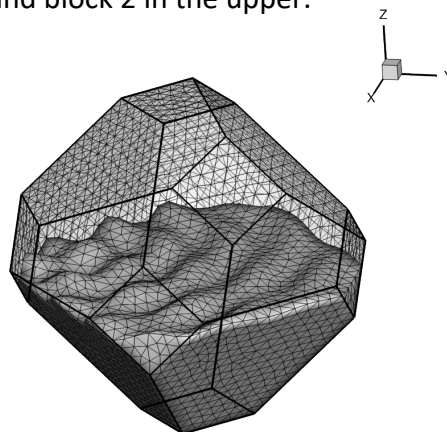
**120nm\_3block.pat**



9.

120nm 2-block cuboctahedron meshed at 3nm with irregular interface. Elements in the lower section are block 1, and block 2 in the upper.

**Cubo\_120nm\_ripple.pat**

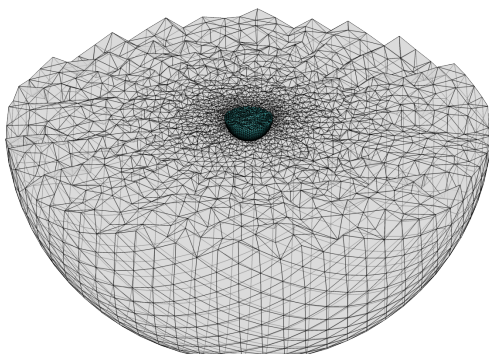


10.

A two block sphere. The inner is block 1 and the outer is block 2.

**2sphere\_200nm\_20nm.pat** has an inner diameter of 20nm meshed at 3nm and outer diameter of 200nm meshed at 30nm

**2Sphere\_100nm\_SV.pat** has an inner diameter of 100nm meshed at 5nm and an outer diameter of 1000nm meshed at 50nm

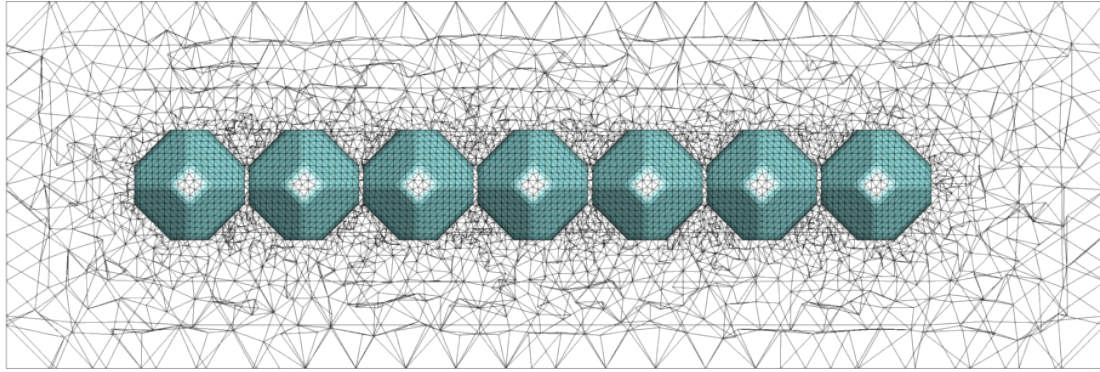


11.

A two block chain of cuboctahedra. The inner particles are all block 1. The surrounding cuboid space is block 2.

**7Grains\_120nm\_5.pat** (shown): 7 x 120nm cuboctahedra grains meshed at 5nm separated by 5nm. Cuboid space meshed at 50nm.

**7Grains\_120nm\_40.pat**: 7 x 120nm cuboctahedra grains meshed at 5nm separated by 40nm. Cuboid space meshed at 50nm.



12.

Two simple cubotahedra grains

**110.pat**: 110nm particle meshed at 5nm

**120.pat**: 120nm particle meshed at 5nm