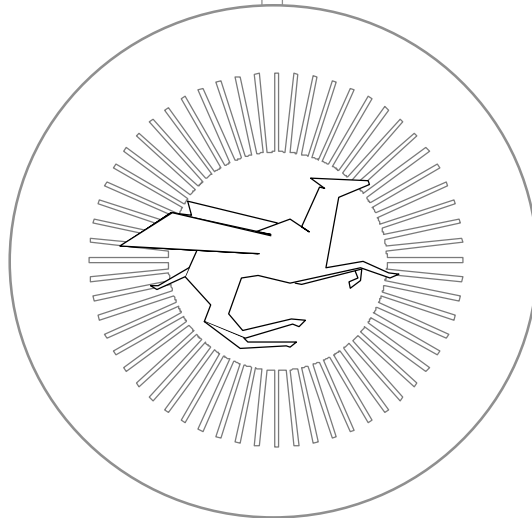




STRUCTURAL ORIGAMI - I

LET US MAKE BUCKY BALLS

SUBRAMANIA RANGANATHAN



VIDYANANTHA
A REGISTERED SOCIETY FOR THE PROMOTION OF EDUCATION, ARTS AND CRAFTS

PADMAVATI PARADISE APARTMENTS
#2, 12-13-262, STREET NO. 8, TARNAKA, HYDERABAD- 500 007



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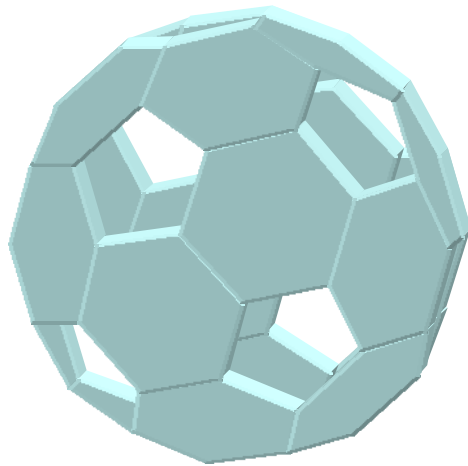
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RESPECTFULLY DEDICATED TO
DARSHAN RANGANATHAN
WHO PASSED AWAY ON HER
SIXTIETH BIRTHDAY
JUNE 4, 2001



LET US MAKE BUCKY BALLS!



5



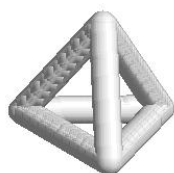
CARBON BALLS ARE SO MUCH LIKE SOCCER BALLS!

When layers are peeled off from a graphite rod under intense heat, some of these curl up into a ball. They are now called by different names, Buckminsterfullerene, fullerene, bucky ball and more appropriately, simply, C_{60} .

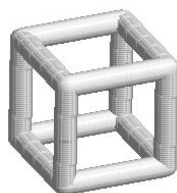
Most exciting discoveries fade off with time, but in this case the interest in bucky balls continues to be unabated with each year bringing in new applications, in the fields of structures, optical materials, super-conductor design, probes, targeting agent for bio molecules, nanotubes, therapeutics, nanotransistors...

How could one go about putting together a bucky ball? Before that let us have a small excursion into the mathematical relationship between bucky and others!

There are five fundamental solids, called platonic solids that enjoy maximum symmetry. These are tetrahedron, octahedron, cube, dodecahedron and icosahedron. Icosahedron has twelve peaks arising from congruence of five equilateral triangles. If one marks the middle edges of these triangles, connects them and clips off the small cap at all the peaks, one gets the bucky ball! It is nice to know this, but hardly the practical way to make one. Still it tells us that a bucky ball or a soccer ball has 20 hexagons and 12 pentagons.



TETRAHEDRON



CUBE



OCTAHEDRON



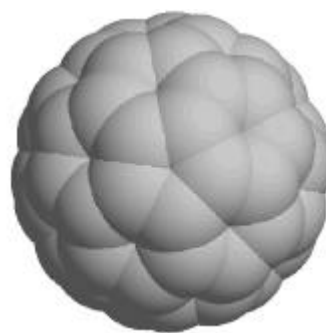
DODECAHEDRON



EICOSAHEDRON



C_{60}



SPACE-FILL MODEL OF C_{60}