

Re: Unravelling the mysteries of coiling ropes

Source: <http://sci.tech-archive.net/Archive/sci.physics/2007-10/msg01891.html>

- *From:* Edward Green <spamspamspam3@xxxxxxxxxxx>
 - *Date:* Sun, 28 Oct 2007 13:49:56 -0700
-

On Oct 26, 12:14 am, Sam Wormley <sworml...@xxxxxxxxxxx> wrote:

Unravelling the mysteries of coiling ropes
<http://physicsworld.com/cws/article/news/31564;jsessionid=F2B86CF9053...>

If you carefully lower a rope onto the floor it will probably form a neat coil. While most people wouldn't give this a second thought, an international team of physicists has done a series of experiments and numerical simulations to work out why. Their new insights into coiling could shed light on the behaviour of an important class of materials called "elastic ropes", which includes DNA molecules and structural reinforcing rods in buildings (Phys. Rev. Lett. 99 154302).

Neil Ribe at the University of Paris-7 and colleagues in Iran and the Netherlands used a reel powered by an electric motor to feed ordinary rope or thread down through a hole and onto a glass or paper plate below. The rate of descent and the distance between the reel and the plate could be changed, allowing the team to study coiling over a wide range of speeds and drop lengths. A second set of similar experiments looked at the coiling of soft strands of spaghetti.

Ribe told physicsworld.com that the team is the first to perform controlled lab experiments on coiling and their use of different materials allowed them to build up a comprehensive understanding of why some ropes coil and others don't.

According to Ribe, one surprise result is that the coiling always occurred at several different "frequencies" for fixed values of the feed rate and fall distance. These frequencies correspond to the vibrational modes of the nearly vertical upper part of the falling rope. They discovered that coiling occurs when any of these frequencies matches the angular frequency at which bottom end of the rope whirls into a coil.

What is a "frequency", and how does it differ from a frequency?