In any system described by interacting field equations with particular symmetries, one can expect solutions of a very remarkable type, even at the classical level. A well known example is the Schwartschild solution in General Relativity.

**Hedgehogs**

In pure gauge theories with unbroken symmetry, there are spherically symmetric solutions which have arbitrary energy. In pure chirally symmetric scalar field theories, one might consider solutions with unconventional boundary conditions, but their energy is infinite except when they occur in rotating pairs.

In gauge theories with Higgs mechanism there are spherically symmetric solutions with definite energy, but many of them will be unstable. We report a stable solution in all gauge models where the electromagnetic group $U(1)$ is a subgroup of a semi-simple local gauge group like $SU(2)^N \otimes [SU(3)]^N \otimes \ldots$ etc. It will present itself to the observer as a finite mass magnetic monopole. The magnetic charge $g$ satisfies Dirac's quantization condition

$$eg = 2\pi n,$$

where $n$ is an integer. Indeed, $n$ may be set equal to one if we replace $e$ by the minimal charge allowed by the group structure (which for instance is $e \ell$ in the Georgi-Glashow model), and we see that Schwinger's condition is violated.

The calculation has been performed in more detail in the Georgi-Glashow model. We put for the Higgs field

$$Q_a(x,t) = \pi_a Q(|x|),$$

and for the gauge vector field

$$W_i^a(x,t) = \epsilon_{abc} x_b W^c(x), \quad i = 1,2,3$$

The boundary conditions are

$$Q |x| = F/|x|$$

$$W |x| = \frac{n}{2}|x|^{n-1}, \quad (n > 1)$$

$$Q, W$$ finite as $|x| \to 0$.

The magnetic charge then follows from the field equations, and the mass of the particle turns out to be

$$M_{monopole} = \frac{4\pi}{e} M \frac{e}{e} C,$$

where $M$ is an intermediate vector boson mass; $e$ is the charge of the electron and $C$ depends on the parameter(s) of the theory but it is close to one.

It has been proposed to call classical solutions with the spherical topology "hedgehogs".

**Vortices**

Some theories might also allow for solutions with the topology of the dual string: a well known example is the Abelian Higgs model with the quantized magnetic flux lines. We do not expect that analogous, stable, solutions exist in the current models for weak and electromagnetic interactions, but attempts have been