Abstract: This work is divided into two thematic parts. In the first part we present the theory of special function spaces - H^α and the proof of existence of a unique weak solution of the studied equation. In the second part we show that the dynamical system induced by the solution semigroup is dissipative. We also show that, using the cited methods, an exponential attractor can be constructed for the discrete dynamical system and we give explicit estimation of its fractal dimension. We then apply these results to the model of beam equation with weak damping.