

# Real Rational knots

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## Abstract

A Real rational knot of degree  $d$  is an embedding of  $\mathbb{R}P^1 \rightarrow \mathbb{R}P^3$  defined by  $[t, s] \rightarrow [p_0(t, s), p_1(t, s), p_2(t, s), p_3(t, s)]$  where  $p_i(t, s)$  are homogeneous polynomials of same degree  $d$ , that do not vanish simultaneously. It is easy to see that all knots in  $\mathbb{R}P^3$  are isotopic to some real rational knot. Real rational knots can be categorized in two groups: the one that lie completely in  $\mathbb{R}^3$  and the one that intersect a plane at infinity. we call the first one as *affine knots* and the other one as *projective knots*. Real rational affine knots are same as our classical knots. Real rational knots are projective closure of maps  $\mathbb{R} \rightarrow \mathbb{R}^3$  given by  $t \rightarrow (r_0(t), r_1(t), r_2(t), r_3(t))$  where  $r_i(t)$  are rational functions. This talk will present a technique to construct a real rational knot of reasonably low degree which is ambient isotopic to a given affine knot. We will generalize it to obtain real rational knots isotopic to any projective knot.