

1105-57-30

**Micah W. Chrisman\*** (mchrisma@monmouth.edu). *Applications of Virtual Knot Theory to Knots in 3-Manifolds.*

Knots in compact orientable 3-manifolds can be studied using the method of virtual covers. Let  $K$  be a knot on a compact oriented 3-manifold  $N$ . Suppose  $N$  admits a covering space  $\Pi : \Sigma \times (0, 1) \rightarrow N$  where  $\Sigma$  is a compact oriented surface. Suppose additionally that there is a knot  $\mathfrak{k}$  in  $\Sigma \times (0, 1)$  such that  $\Pi(\mathfrak{k}) = K$ . Then we say that  $\mathfrak{k}^{\Sigma \times (0, 1)}$  is a virtual cover of  $K^N$ , denoted  $(\mathfrak{k}^{\Sigma \times (0, 1)}, \Pi, K^N)$ . The knot  $\mathfrak{k}$  stabilizes to a virtual knot  $v$  called the virtual knot associated to the virtual cover. Under many circumstances, the associated virtual knot  $v$  is itself an invariant of  $K$  in  $N$ . Virtual knot invariants applied to  $v$  detect geometric properties of  $K$  in  $N$ . We present a general algebraic theory of virtual covers that is based on the notion of commensurable manifolds. The theory will be illustrated with some new examples and applications. (Received August 09, 2014)