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Chad D Giusti* (cgiusti@willamette.edu), Department of Mathematics, Willamette University, 900 State St., Salem, OR 97301. *Unstable Vassiliev theory.*

We begin by describing a directed system of model spaces, called plumbers' knots, which converge in weak homotopy type to the space of long knots in \mathbb{R}^3 . On these spaces we construct an inverse system of cohomological spectral sequences whose limit contains the classical Vassiliev spectral sequence, from which arises the family of finite-type knot invariants. In doing so, we introduce a new collection of geometric and combinatorial tools for the study of finite-type invariants. Relying on the accessible geometry of the spaces of plumbers' curves we then extend the notion of Vassiliev derivative to all singularity types of plumbers' curves and perform some explicit computations in these unstable spectral sequences. (Received July 26, 2011)