Arcs, circles, finite graphs and inverse limits of set-valued functions

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Recently, G and Štimac introduced the notion of a splitting sequence and showed that the inverse limit of a sequence of continuous functions on intervals is an arc, if and only if the sequence does not admit a splitting sequence. It is natural to ask: when is the inverse limit of a sequence of upper semicontinuous set-functions on intervals (a GIL), an arc? A GIL need not be connected, path-connected, nor 1-dimensional, and it may contain ramifi cation points. Therefore, it is not enough to simply generalise the notion of a splitting sequence. Characterisations of connectedness, path-connectedness and dimension have been established, so we consider the broader question: when is a GIL on intervals a finite graph, and in particular, an arc or a circle? We characterise the order of a point, and we strengthen a result by Nall and Vidal-Escobar who showed that if an inverse limit of set-valued functions on intervals is a finite graph, then for some $n \in \mathbb{N}$, it is homeomorphic to the Mahavier product of the first n functions of the sequence.
(joint work with Michael Lockyer)