EMBANKMENT dams and flood defence embankments (levees) constructed from soil are critical public infrastructure for flood prevention, water storage and hydroelectric power generation. Internal erosion, also known as piping, is one of the main causes of dam and levee embankment breach during floods. It occurs when soil particles are washed out of an embankment by water seepage, eroding material from within until the embankment collapses. This presentation will consider recent research into internal instability, one form of internal erosion. Internal instability involves the preferential erosion of finer grains in gap-graded or broadly graded materials. The research presented here has used particle-scale discrete element modelling (DEM) to study the fundamental mechanisms of internal instability. The presentation will explore links between empirically-based rules used to assess internal stability and the nature of stress transmission between particles in the soil. It will also discuss approaches used to measure constrictions (pore throats) in filters and the link between the filter particle size distribution and the constriction size distributions. Data from DEM simulations coupled with computational fluid dynamics (CFD) will be presented to explore the critical conditions driving the initiation of instability.