Numerical simulation for pattern formation of river channel

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One of the macro-structure of alluvial streams such as the formation of meanders and braided is considered. Assuming hydrostatic pressure distribution in verticals and ignoring the velocity variations in verticals, we obtain basic two-dimensional flow dynamics. We use a model which consists of the basic two-dimensional balance equation coupled with a phenomenological dynamics which is a soil erosion and a deposition of the suspended sediment. Through extensive simulations, the morphologies corresponding to straight, meandering and braided are found by changing the initial slope of a drainage area. A initially straight stream is stable if the slope of the river bed is small. By increasing the initial slope of the river bed, the straight stream becomes unstable and forms a meandering river, also stream line itself moves down with time. Beyond a critical slope, the meandering river changes to form a braided stream channel. The morphological change of river channel is characterized by the area of the river, time averaged mean flux of water, and depth-to-width ratio of a river.