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Mathematical modeling of erosion and sedimentation in networks[1] HAMAD EL KAHZA, TANVI PATEL, PEJMAN SANAEI, New York Institute Of Technology — Erosion and sedimentation, in the environmental context, is represented as the evolution of solid bodies due to the forces exerted by the fluid or air on the contact surface, which both often lead to reconfiguration and change of the topology of the geological structures and porous media. These processes are notably very complicated and challenging to study in reality. In this work, we formulate novel and idealized mathematical models to examine the internal evolution of flow-networks in the setting of cylindrical channels, undergoing a unidirectional flow, by using asymptotic and numerical techniques. Starting from the Stokes equations combined with an advection-diffusion solid transport, we propose a model to construct a complete analysis of both the erosion and sedimentation in geological structures and porous media. The considered approach is of the form of threshold laws: the fluid-solid interface erosion and sedimentation occur when the total shear stress is, respectively, greater and lower than some specific critical values, depending on the solid material. As a consequence of the erosion and sedimentation, the structure channels' radii expand and shrink respectively.

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