

Mathematical modeling in the
Soil-Plant-Atmosphere continuum
Part II. Water erosion on vegetated surfaces

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The water circulation in the **Soil-Plant-Atmosphere** continuum and especially the water-induced soil erosion are issues of primary concern in the new era of climate change. Our goal is to provide a mathematical tool to investigate the water-soil and water-plant interactions involved in the complex process of water flow on plant-covered soil surfaces. Basically, the mathematical model consists of an extended Saint-Venant system of equations for water flow coupled with Hairsine-Rose equations for soil erosion. The classical Saint-Venant model is thus modified in order to take into account the presence of plants on the soil surface. The Hairsine-Rose model is rewritten in order to take into account the grain size and density gradation of sediment. Some properties of the strong coupled Saint-Venant and erosion model are investigated.