

## **Analytical and Numerical Results of Exner's Sediment Transport Equations**

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Exner developed two sediment transport equations describing how sandy river beds are molded into ripples under the action of running water. Exner's first equation and solution, based on the sediment carrying capacity of the flow being proportional to the flow velocity, are the most interesting and realistic. The analytic solution bifurcates and becomes chaotic as time increases. Discretizing the first order equation using the Lax scheme gives more stable results than for forward time-centered space or centered time-centered space schemes. This equation produces bedforms similar to climbing ripples in cross-section. Exner's second equation and solution do not improve upon the first despite incorporating friction and water surface slope. The analytic solution does not resemble real ripples and although the differential equation was discretized using a backward difference scheme, computed results show instability.