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Application of equilibrium theory on alluvial channel-form adjustment in a large river heavily loaded with sediment

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Taking the width/depth ratio of an alluvial channel as an independent variable, a variational analysis of basic flow relationships shows that flow is able to achieve stationary equilibrium by adjusting channel geometry when the condition of maximum flow efficiency (MFE) is satisfied. To examine if this theory of self-adjusting channel morphodynamics can be practically applied to large river systems heavily loaded with sediment, this study examines the degree of correspondence between theoretically determined equilibrium channel geometries and actual measurements along the lower Yellow River. Using the Meyer-Peter and Müller bedload relation modified on the basis of MFE theory and relations of flow continuity and resistance we present a detailed investigation of the potential physical causes and main factors resulting in the correspondence.