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Tectonophysical interpretation of river anomaly using equation of Euler and Fermat-Bernoulli: a case in southwest Iran

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Euler(1707-1783), Fermat(1601-1665) and Bernoulli(1677-1748) believe that nature approaching its aim optimumically and economically in a best manner. According to this idea, we adopt Minimum Time Parametric Equation(MTPE) of Fermat-Bernoulli which giving river bed elevation as a function of downstream distances and Euler's Elastic Band Equation(EEBE) which characterized by minimum summation of the squares of directional deflection angle along river centerline. We assume that Euler and Fermat-Bernoulli are reasonable simple functions for modeling river path in plan and depth in homogenous-isotropic and equilibrium condition respectively. Under controlled condition, comparing anomalous longitudinal profile and meander loops with this basic model can detect some of tectonic deformation such as uplifting and subsidence in Z direction and some of anisotropic condition such as variation of lithology and faulting in X-Y plan.

This study has done in northern part of foreland basin of Arabian platform in foothill of Zagros collision belt southwest of Iran which biggest rivers and petroleum reservoir lies in it. For approaching our aim we collecting data from field observation and 1/25000 topographical map from Karun, Karkheh, Dez, Jarrahi and Zohreh rivers and their tributaries using software Origin Ver.7 which offers interesting scientific graphing and analytical framework for fitting and function analysis to compute constant parameters and statistical coefficients.

In preliminary analysis there is a good fitting occurs between a theoretical curve and actual profile particularly in mountainous segment by putting actual elevation as a one

of four variable parameters in Minimum Time Equation. These revealed positive and negative anomaly which can refer them to uplifting and subsidence in Zagros simply folded belt and Dezful Embayment respectively.