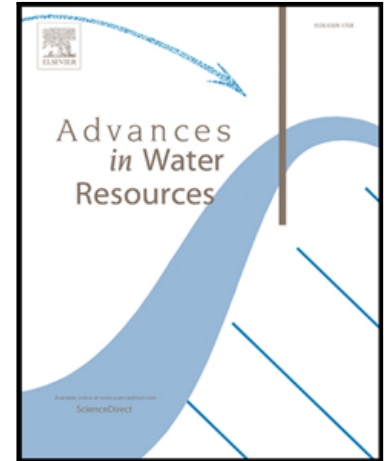


Accepted Manuscript

River banks and channel axis curvature: effects on the longitudinal dispersion in alluvial rivers

Stefano Lanzoni, Amena Ferdousi, Nicoletta Tambroni

PII: S0309-1708(17)30748-0
DOI: [10.1016/j.advwatres.2017.10.033](https://doi.org/10.1016/j.advwatres.2017.10.033)
Reference: ADWR 2997



To appear in: *Advances in Water Resources*

Received date: 26 July 2017
Revised date: 27 October 2017
Accepted date: 28 October 2017

Please cite this article as: Stefano Lanzoni, Amena Ferdousi, Nicoletta Tambroni, River banks and channel axis curvature: effects on the longitudinal dispersion in alluvial rivers, *Advances in Water Resources* (2017), doi: [10.1016/j.advwatres.2017.10.033](https://doi.org/10.1016/j.advwatres.2017.10.033)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

River banks and channel axis curvature: effects on the longitudinal dispersion in alluvial rivers

Stefano Lanzoni^a, Amena Ferdousi^a, Nicoletta Tambroni^b

^a*Department of Civil, Environmental and Architectural Engineering, University of Padua, Italy*

^b*Department of Civil, Chemical and Environmental Engineering, University of Genova, Genova, Italy*

Abstract

The fate and transport of soluble contaminants released in natural streams are strongly dependent on the spatial variations of the flow field and of the bed topography. These variations are essentially related to the presence of the channel banks and the planform configuration of the channel. Large velocity gradients arise near to the channel banks, where the flow depth decreases to zero. Moreover, single thread alluvial rivers are seldom straight, and usually exhibit meandering planforms and a bed topography that deviates from the plane configuration. Channel axis curvature and movable bed deformations drive secondary helical currents which enhance both cross sectional velocity gradients and transverse mixing, thus crucially influencing longitudinal dispersion. The present contribution sets up a rational framework which, assuming mild sloping banks and taking advantage of the weakly meandering character often exhibited by natural streams, leads to an analytical estimate of the contribution to longitudinal dispersion associated with spatial non-uniformities of the flow field. The resulting relationship stands from a physics-based modeling of the behaviour of natural rivers, and expresses the bend averaged longitudinal dispersion coefficient as a function of the relevant hydraulic and morphologic parameters. The

*Corresponding author

Email addresses: stefano.lanzoni@unipd.it (Stefano Lanzoni), a_ferdousi@easternuni.edu.bd (Amena Ferdousi), stefano.lanzoni@unipd.it (Nicoletta Tambroni)

Download English Version:

<https://daneshyari.com/en/article/8883348>

Download Persian Version:

<https://daneshyari.com/article/8883348>

[Daneshyari.com](https://daneshyari.com)