数据库、信号与信息处理

重力固体潮IMF的AM-FM模型及其非线性拟合

吴庆畅[1]，周 挚[2]，梁 虹[3]，全海燕[3, 4]，王天理[3]

1.云南民族大学 物理与电子电气信息工程学院，昆明 650031
2.云南省地震局，昆明 650224
3.云南大学 信息学院，昆明 650091
4.昆明理工大学 信息工程与自动化学院，昆明 650051

摘要 首先建立AM-FM数学模型，用多个相近载波的调幅信号组合描述它。利用最小二乘法对幅度调制和频率调制两个部分分别进行非线性拟合；拟合以相关系数满足一定条件为精度控制原则，拟合项数以相邻相关系数不再显著变化为判定条件。有效性检验证明该方法切实可行。重力固体潮IMF的拟合结果表明，AM-FM数学模型可以很好地刻画重力固体潮IMF；重力固体潮是多个AM-FM信号合成的复合信号。为后续深入研究重力固体潮的AM-FM信号特征、循环平稳信号特征等性质建立了良好的数学基础。

关键词 AM-FM模型 非线性最小二乘法 数据拟合 重力固体潮 本征模态函数（IMF）
分类号 TP18

AM-FM model of gravity tide IMF and its non-linear data fitting

WU Qing-chang[1]，ZHOU Zhi[2]，LIANG Hong[3]，QUAN Hai-yan[3, 4]，WANG Tian-li[3]

1.School of Physics & Information Engineering，Yunnan Nationalities University，Kunming 650031，China
2.Earthquake Administration of Yunnan Province，Kunming 650224，China
3.School of Information Science and Engineering，Yunnan University，Kunming 650091，China
4.School of Information，Kunming University of Science and Technology，Kunming 650051，China

Abstract
 In this paper，the non-linear least squares data fitting method for the AM-FM model of the the gravity tide IMF signal is proposed.Firstly，the AM-FM model is decomposed amplitude modulation signal and frequency modulation signal which is fitted by using the non-linear least squares method separately.The fitting number is determined by the correlation coefficient.Then the IMF signal of the gravity tide is fitted by the AM-FM model.The experimental results show that the gravity tide IMF signal can be well described by the AM-FM signal.A foundation is established for further discussion its characteristic such as the cyclostationarity.

Key words AM-FM model non-linear least square method data fitting gravity tide Intrinsic Mode Function（IMF）

通讯作者 吴庆畅 ahwqc@163.com