

40.面向公平与福祉的城市交通地理

Unravelling the spatial directionality of urban mobility

赵鹏军、王浩、刘启旻、闫小勇、李京忠

北京大学城市与环境学院、北京大学城市规划与设计学院、北京交通大学系统科学学院、许昌大学城市与环境学院

摘要: As it is central to sustainable urban development, urban mobility has primarily been scrutinised for its scaling and hierarchical properties. However, traditional analyses frequently overlook spatial directionality, a critical factor in city centre congestion and suburban development. Here, we apply vector computation to unravel the spatial directionality of urban mobility, introducing a two-dimensional anisotropy-centripetality metric. Utilising travel data from 90 million mobile users across 60 Chinese cities, we effectively quantify mobility patterns through this metric, distinguishing between strong monocentric, weak monocentric, and polycentric patterns. Our findings highlight a stark contrast: residents in monocentric cities face increasing commuting distances as cities expand, in contrast to the consistent commuting patterns observed in polycentric cities. Notably, mobility anisotropy intensifies in the outskirts of monocentric cities, whereas it remains uniform in polycentric settings. Additionally, centripetality wanes as one moves from the urban core, with a steeper decline observed in polycentric cities. Finally, we reveal that employment attraction strength and commuting distance scaling are key to explaining these divergent urban mobility patterns. These insights are pivotal for shaping effective policies aimed at alleviating congestion and guiding suburban housing development.

关键词: human mobility, mobility directionality, coarse-grained metrics, overall characteristics