

河床裸露地揚塵抑制工法之效益評估

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摘要 台灣河川出海口之季節性揚塵災害日趨嚴重，揚塵抑制工法之施作效益逐漸受到重視。雖可藉由風洞試驗來進行各類工法之效益評估，但風洞試驗之邊界效應及模型尺寸對試驗結果影響極大，常無法實際反映工法之揚塵機制。目前各類工法之施作效益，由於缺乏大範圍的量測資料及明確的量化性指標，而難以進行評估。本研究先定義揚塵抑制效率 FDRE (Fugitive Dust Restrain Efficiency) 值，首先，模擬大安溪出海口裸露地揚塵污染區域，2008 年卡玫基颱風及鳳凰颱風過後，各類揚塵抑制工法施作前、後之揚塵濃度 PM10 濃度，並計算法之 FDRE 值及施工成本(Cost)，即可求得工法之揚塵抑制效益(Fugitive Dust Restrain Benefit, FDRB=Cost/FDRE)。最後，並將揚塵 PM10 濃度值轉換為空氣污染指標 PSI (Pollutant Standard Index)，來探討出海口揚塵期間之空氣品質。由分析結果顯示，若不考慮工法之施工成本時，採用水幕工法可獲得最高之揚塵抑制效率(FDRE 值最高)。反之，在考量施工成本之情況下，則以葉脈式水覆蓋工法最為經濟(FDRB 值最低)。另外，就池浸式水覆蓋工法而言，其覆蓋率與裸露地之揚塵抑制效果成正比。

關鍵詞：PM10 濃度、揚塵抑制工法、空氣污染指標、揚塵抑制效率(FDRE)、揚塵抑制效益(FDRB)。

Beneficial Analyses of Fugitive Dust Restrain Works on Bare Land of Riverbed

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ABSTRACT Due to the increasing severity of season fugitive dust at estuary area, the public agencies of government gradually pay more attention to various refrain works in practice. Although the benefit of various refrain works on fugitive dust can be evaluate by wind tunnel test in laboratory, the testing results are always influenced by the boundary effect and size effect of the model and unable to fully reflect the dispersion mechanism of fugitive dust in field site. At present, it is difficult to evaluate the benefit of various refrain works because of lacking of a definite and quantitative index. Incorporating with the construction cost a FDRE (Fugitive Dust Restrain Efficiency) value was defined to evaluate the refrain-efficiency and cost/benefit of various refrain works of fugitive dust constructed at the estuary of Da-An river during Ka-Maegi and Fung-Wong typhoons in 2008. Firstly, numerical simulations of fugitive dust emission were performed for the estuary area of Da-An river to calculate the concentration of PM10 with and without installation of fugitive dust refrain works and the corresponding FDRE values and construction cost(Cost). Subsequently, considering the construction cost and FDRE value one can determine the FDRB (Fugitive Dust Restrain Benefit=Cost/FDRE) values for various refrain works. Meanwhile, the simulations of fugitive dust concentrations were converted into a PSI (Pollutant Standard Index) value to evaluate the air quality during fugitive dust emission at the estuary. According to the analyses, without considering the construction cost, the water curtain method (or sprinkling method) is capable of providing the best refrain effect (with highest FDRE value) to fugitive dust emission. On the contrary, the vein-type watering covering method is the most economic method to fugitive dust refrain (with lowest FDRB value). In addition, the refrain effect of water covering method is positively increasing with the coverage ratio.

Key Words : PM10 concentration, fugitive dust refrain works, pollutant standard index, fugitive dust refrain efficiency, fugitive dust refrain benefit.

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