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*Αριθμητική Προσομοίωση Φυσικού Αερισμού σε Γεωμετρία Κτηριακής Κλίμακας για τον Προσδιορισμό Συνθηκών Θερμικής Άνεσης (Numerical Simulation of Natural Ventilation in a Building-Scale Geometry for the Evaluation of Thermal Comfort Conditions)*

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*The present study investigates the airflow in and around a naturally ventilated building, which represents a student dormitory, using computational fluid dynamics (CFD) techniques. Turbulence flow is simulated applying the standard k-ε and the RNG k-ε models, both modified to account for wind and buoyancy forces. The focus is to study single-sided natural ventilation in a typical room situated on the ground floor of the student dormitory. Two cases are investigated: a) two openings, and b) one opening, on the windward side of the room. Internal furnishings and three thermal sources (occupant, TV, PC) are taken into account. Two different mechanisms of natural ventilation are examined: a) displacement ventilation (two openings) and b) mixing ventilation (one opening). The numerical results are compared with those obtained by two empirical models related to the effective velocity of incoming air and to the height of neutral level in the case of one opening. It is concluded that the numerical results are in acceptable agreement with those obtained by the empirical models, especially when the standard k-ε model is used. Finally, the mathematical model described is used to evaluate thermal comfort inside the room and the outcome is that the best design is the case with two openings on the windward side of the room*

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K-W: Natural Ventilation, Thermal Comfort, Turbulence Model, Computational Fluid Dynamics, Simulation