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Fast estimation of the time-to-flood on simple geometries

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Time-to-flood is a key parameter during a flooding emergency. In particular, when dealing with complex geometries it is important to know the time required to fill the first flooded room, i.e. the damaged one. Here, a fast solution for the assessment of the time-to-flood of one or two parallelepipiped rooms is proposed. The progressive flooding of the rooms is first simulated employing a linearised simulation technique defining a database of damage cases covering a wide spectrum of geometries. Then, explicit equations based on the main non-dimensional parameters governing the phenomenon are defined. The work highlights the relation between the geometry of a room, the damage opening, the connection opening and the time to fill the first damaged room. The application of the equations is very fast, enabling an instantaneous estimation of the time-to-flood. Then, they are particularly suitable for a direct onboard application or during the generation of large datasets of flooding simulations.

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