

MODELING FLOWS OVER NATURAL OR ENGINEERED SURFACES

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Natural and engineered surfaces are never smooth, but irregular, rough at different scales, compliant, possibly porous, liquid-impregnated or superhydrophobic. The correct numerical modeling of fluid flowing through and around them is important but poses problems. For media characterized by a periodic or quasi-periodic microstructure of characteristic dimensions smaller than the relevant scales of the flow, multiscale homogenization can be used to study the effect of the surface, avoiding the numerical resolution of fine-grained details. In the lecture, the homogenization strategy needed to model the interaction between a fluid in motion and regularly micro-textured, permeable or impermeable walls is revisited and several examples are provided to demonstrate the accuracy and versatility of the approach.

