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SMART FLOW-CONTROL ACTUATORS PROTOTYPING BIOMIMETIC PHENOMENA

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Summary: A number of engineering realizations of thermal riblets is considered which maintains the surface smooth and can operate in an active mode. Two of them are based on direct heating of streamwise strips embedded into the surface layer (1) with applied voltage and (2) with microwave radiation. The latter enables active and remote flow control providing a set of various control parameters. The third engineering solution is the generation of a spanwise array of localized plasma discharges with a resultant array of streamwise thermal wakes. Aerodynamic loads on models are measured in a wind tunnel to evaluate possible improvement of the aerodynamic performance in a range of Reynolds numbers for varying control parameters (type and intensity of disturbances, scales of generated vortices, downstream location of the disturber's array). Possibility of drag reduction is demonstrated with simultaneous growth of lift in a range of the model angles of attack