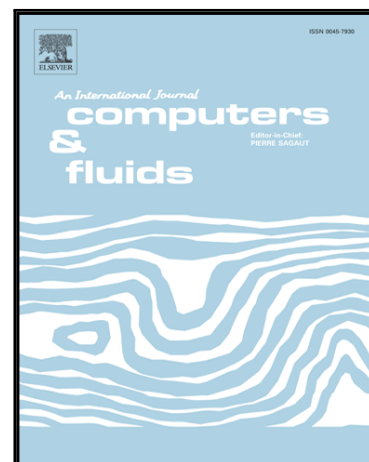


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Hypersonic Transition Induced by Three Isolated Roughness Elements on a Flat Plate

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Highlights

- Boundary layer transition induced by three roughness elements was investigated.
- The transition is dominated by three-dimensional shear layer instability.
- Transition region, aerodynamic force and heat flux were quantitatively analyzed.
- Ramp element is suitable for triggering hypersonic boundary layer transition.

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