Dependence of Drag Over Super Hydrophobic and Liquid Infused Surfaces on Substrate Asperities

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**Project Goal:**
- Advance flow physics understanding
- Quantify drag penalty due to surface’s roughness
- Provide manufacturing design criteria

**The Navier Stokes equations were solved using in-house CFD code for two fluid configuration:**
- Finite difference method
- Level Set method
- Runge-Kutta method

**Results:**

- **DR = Drag Reduction**
  \[ DR = 1 - \frac{\tau}{\tau_{\text{smooth}}} \]
- **\( \tau \) = Shear Stress**
- **\( \tau_{\text{smooth}} \) = Smooth Wall Shear Stress**

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**Why we care:**
- Ships transport 90% of world goods
- Ships produce 3% of world pollution
- Friction causes 80% of ship resistance

**Super-hydrophobic (gas-based) and liquid infused (lubricant-based) surfaces reduce drag**

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- These results are under review for publication

**References:**