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Physicists Unravel Slippery Surface Problem

It's a driver's nightmare: losing control of the car when it careens over a wet road. This phenomenon seems straight forward, but explaining the loss of braking power and rubber skidding remains an open problem for physicists. New computer modeling suggests that the tire rubber forms a seal with the liquid on the road, resulting in a loss of friction.



Tires traveling over wet road surfaces experience between 20 and 30 percent less friction than tires do on dry roads. But current models that invoke hydrodynamics and surface adhesion effects do not adequately address this situation. Erio Tosatti of the International Center for Theoretical Physics and his colleagues developed a new hypothesis to explain what happens between wet surfaces and car tires. In the December issue of Nature Materials, they posit that pools of water on a wet street serve to fill in small valleys on the road surface, which in turn prevents parts of the rubber tire from entering the depressions. The resulting smoother surface causes less deformation of the rubber and less friction.

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When the researchers compared their predictions to data collected using tires on asphalt surfaces, they found them to be in excellent agreement. The results could prove beneficial for tire manufacturers for new product design. --Sarah Graham

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