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FROM VEHICLES TO MOLECULES
TIRE TRIBOLOGICAL PERFORMANCE BALANCE

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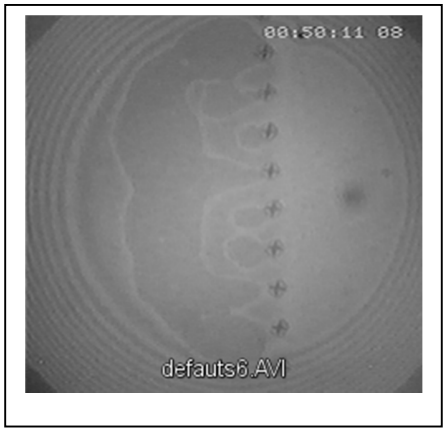
Tires; Rolling resistance; Multiscale

ABSTRACT
The pneumatic tire has to offer the customer a delicate balance of performances, among which traction (and handling), wear and rolling resistance [1] have to be balanced because of their relevance for safety and economy. We will show the many different relevant scales implied [2]. In the future, new improvements in the rolling resistance of tires will be necessary to decarbonize transport, and this without any adverse effect on its safety or environmental footprint.

Through the description of road surfaces [4], and the knowledge of non linear viscoelastic properties of rubber [5] some prediction of the hysteretic contribution to wet friction may be attained [6]. At the smallest scales [7], the dewetting phenomenon enters into play [8] and offers an extra molecular contribution which also brings dry friction to higher levels [3].



Dewetting of an intercalated lubricant film behind nucleators

Experimental [9] as well as numerical [10] methods have been recently developed to further this understanding.

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