

# MECHANICS OF AVALANCHES AND THE WTC COLLAPSE

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Two models of fracturing process are considered. The first one is the progressive failure mode or avalanche when there is an upper structure or mass that moves down under the gravity force and grows because it absorbs a lower structure or mass that is intact, at rest, and decreases in size because it gradually turns into the moving upper mass [1]. The second one is the fracture wave mode when a self-maintaining fracture wave destroys a structure or solid body into debris at the speed of sound [2]. Mathematical models are suggested for both modes.

It is proven that the progressive failure or avalanche is characterized by the acceleration of the moving mass that is several times less than the gravitational acceleration; material is not pulverized in this fracturing mode. The progressive failure or avalanche is accompanied by the sound emission of boom. This mode is valid for snow avalanches and, probably, for some landslides [1].

It is proven that the fracture wave mode is characterized by pulverization of a solid body or structure into small fragments and by intense sound emission resembling explosion, and it is accompanied by a collapse of a solid body or structure, with the destructed fragments falling down in the regime of free fall at the gravitational acceleration. This mode is valid, e.g., for bursts of hard rocks in deep mines of South Africa and for the collapse of the Batavian tears [2]. An analysis of observation data collected by National Institute of Standards and Technology (NIST) proves that this fracturing mode took place on September 11, 2001 when the WTC towers collapsed as a result of the fire [3, 4].

## References

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