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Non-Lineairty in Avalanche Dynamics

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Powder snow avalanches are dramatic natural phenomena which affect the way in which we live in mountainous regions. Field measurements from avalanches remain one of the most important and useful sources of information about their dynamics and behavior. In this paper we consider all the video data from the Vall\'ee de la Sionne test site from the years 2003 to 2005. We compare this data with the KSB model, which is a compact integral model, and plume models. Observations are made regarding the lateral spreading behavior of the avalanches. We show that the slow lateral spreading can only be explained by large internal velocities and anisotropic turbulence generated by the large scale motion in the avalanche head. We discuss the difficulties in defining the volume of a powder snow avalanche. Should we include just the head or also the turbulent wake that extends back to the starting zone?