Snow Avalanche Mechanics: Engineering Applications and Basic Research

P. Bartelt, M. Christen , F Dufour, **M. Kern**, K. Platzer and B. Sovilla

WSL, Swiss Federal Institute for Snow and Avalanche Research, SLF, 7260 Davos Dorf, Switzerland (kern@slf.ch, phone: +41 81 417 0159, fax +41 81 4170 110)

In this presentation, we survey long-standing problems and recent advances in the field of snow avalanche mechanics. Topics include: (1) rheology and the nature of energy dissipation in flowing avalanches, (2) the magnitude of impact pressures, (3) numerical modelling and hazard mapping, (4) the design of snow sheds and avalanche dams (5) the role of entrainment in avalanche motion and, finally, (6) the application of results of scaled experiments in safety-relevant design procedures. Advances in these fields have been accomplished by a combination of experimental, numerical and theoretical approaches. Experimental observations at our full scale test site and instrumented snow chute and in scaled laboratory experiments are the key ingredients driving the numerical and theoretical investigations. However, like many natural hazards, snow avalanche mitigation strategies require solutions before a complete and detailed understanding of a process is fully developed. A schism between engineering and basic research arises. Although we cannot solve this problem, we demonstrate how our research helps in formulating new snow avalanche mitigation measures.