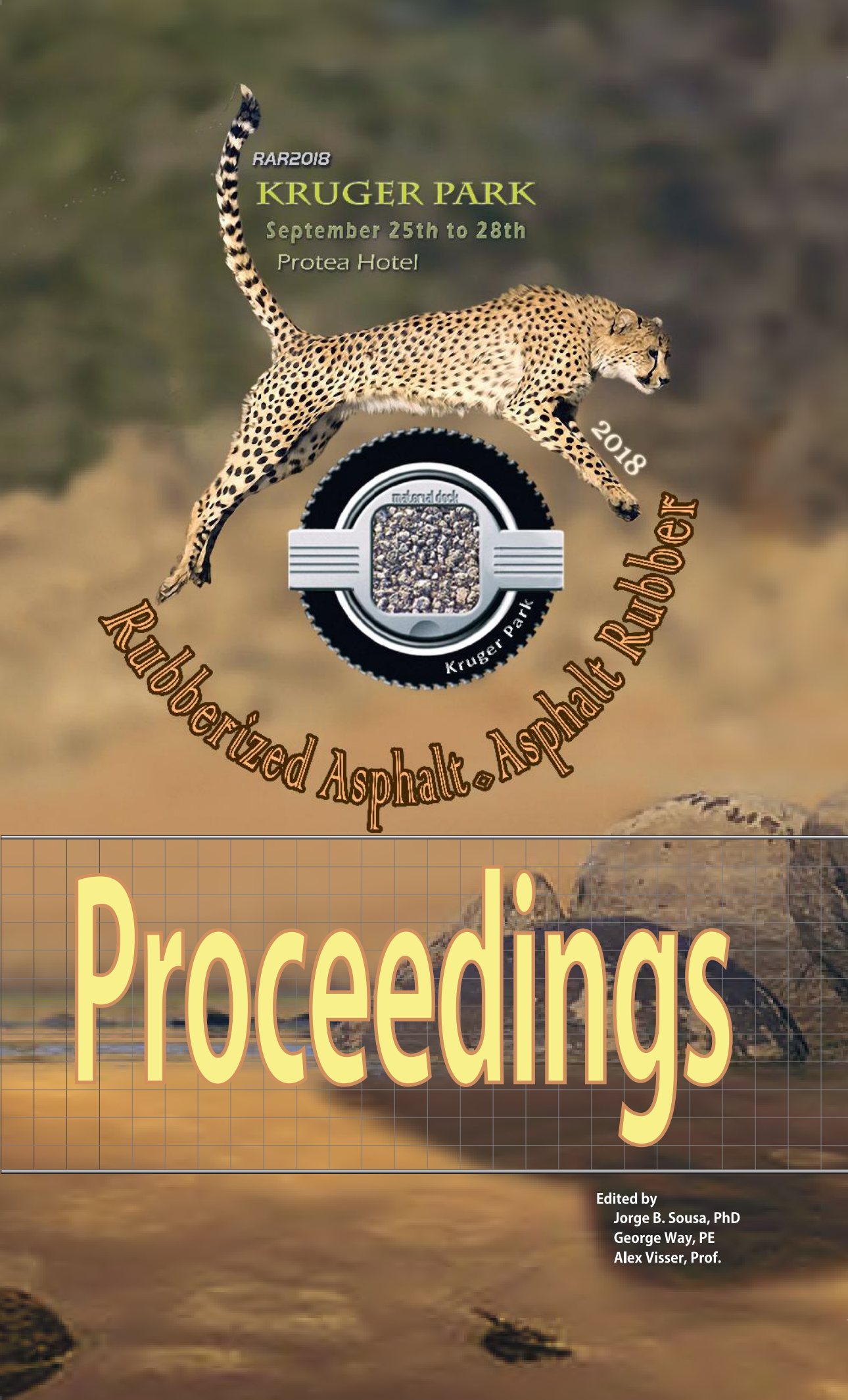

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Reacted and Activated Rubber (RAR) PG64-22 Binder Study

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ABSTRACT. The traditional production of Asphalt Rubber (AR) requires costly equipment at the asphalt plant that in which is not even available in many countries. Reacted and Activated Rubber (RAR) is a process to overcome the equipment issue and allow agencies to produce AR mixtures which give superior performance compared to conventional mixtures. The objective of the study is to compare binder properties of RAR to traditional AR production. This research compares the properties of RAR at 0%, 17%, and 23% by weight mixed with a virgin PG 64-22 binder.

Several laboratory tests were conducted to determine the rheological properties of the virgin binder and modified binder with RAR. The cone penetrometer measures binder consistency. As the RAR percentage increased, the penetration decreased indicating increased binder stiffness. The softening point increased as the RAR increased indicating reduced temperature susceptibility. The rotational viscometer showed an increase in viscosity with the addition of RAR. The Dynamic Shear Rheometer (DSR) test measures shear deformation and indicated improved performance grade with RAR. The Bending Beam Rheometer (BBR) test measures stiffness at low temperatures and showed a lower measured stiffness with the addition of RAR. Multiple Stress Creep and Recovery (MSCR) measures percent recovery and non-recoverable creep (J_{nr}). As the RAR percentage increased, the percent recovery increased and J_{nr} decreased. The resilience of the modified binder increased as the RAR percentage increased. Ultimately, the RAR modified binder improves the rheological properties of the virgin PG64-22 binder and performs better than conventional asphalt rubber mixtures.

KEYWORDS: crumb rubber, rheology, activated rubber, dynamic shear rheometer, bending beam rheometer, multiple stress creep and recovery, penetration, softening point, Brookfield viscosity,