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Results of the 2016 UT Modeling Benchmark Obtained with Models Implemented in CIVA

Gwénaél Toullelan¹, Raphaële Raillon¹, Steve Mahaut¹, Sylvain Chatillon¹, Sébastien Lonnet²,
¹CEA LIST, Centre de Saclay, 91191 Gif-sur-Yvette, France; ²EXTENDE, Le Bergson, 15
Avenue Emile Baudot, 91300 Massy, France

For several years, the World Federation of NDE Centers, WFNDEC, proposes benchmark studies in which simulated results (in either ultrasonic, X-rays or eddy current NDT configurations) obtained with various models are compared to experiments. This year the proposed UT benchmark concerns inspection configurations with multi-skips echoes. This technique is commonly used to inspect thin specimen and/or in case of limited access inspection. This technique relies on the use of T45° mode in order to avoid mode conversion and to facilitate the interpretation of the echoes. To evaluate the influence of the beam divergence on the detectability after several skips, inspections were done with two probes working at 5MHz, with two different apertures. To simplify coupling conditions and probe parameters adjustment, inspections were done using full immersion technique.

This communication presents the results obtained for this benchmark with the models implemented in the CIVA software. The results concern echoes from Side Drilled Holes (SDH) and vertical breaking notches after several skips of the beam on the surface and the bottom of a planar block (as displayed in Figure 1). In CIVA, the field radiated by the probe is computed by applying the so-called pencil-model, the PTD approximation (based on Kirchhoff and GTD models) is then applied to predict the response of notches and the SOV (Separation of Variables) model is used for the SDH responses. The comparison between simulated and experimental results are presented and discussed.

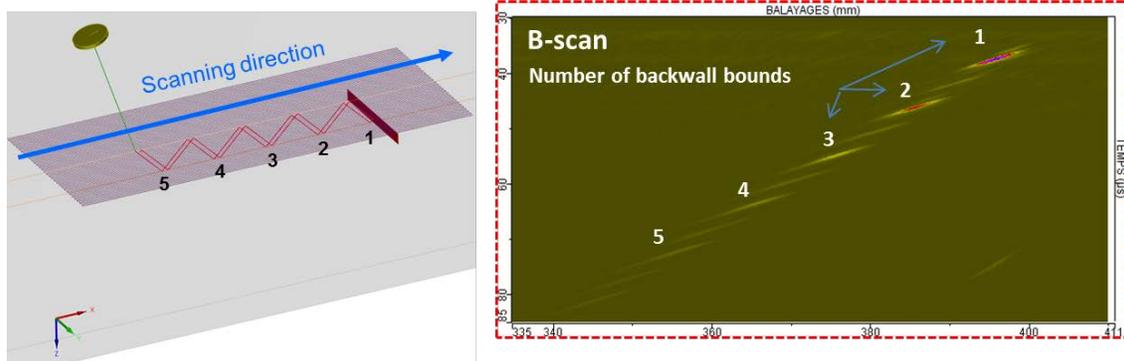


Figure 1. Multi-skip inspections of a backwall breaking notch inside a planar part with an immersion technique. Left: sketch of the inspection. Right: experimental Bscan image with up to 5 skips echoes.