Fractures and cracks in brittle rock may have significant effects on the propagation of seismic waves, particularly on shear-wave anisotropy, but cracks occur in many different configurations and have different effects on seismic waves. Open fluid-filled cracks have large impedance contrasts and may have strong seismic effects. However, in some geological and laboratory estimates of cracks and cracking, a clear distinction is not always drawn between cracks filled with fluids, and healed- or cemented-cracks filled or partially filled with solids. This paper examines numerical formulations for the theoretical effects of veins, sealed and cemented cracks, and planes of bubble inclusions, and compares them with the effects of open gas- and liquid-filled cracks. Except in special cases of very large crack densities, the overall effect of such solid-filled cracks on seismic waves is likely to be small.

Fractures and cracks in high-temperature rock are likely to be intergranular cracks filled with interstitial, possibly highly viscous, melt. Such cracks are also expected to have large shear-wave impedance contrasts but negligible effect on P-wave propagation. Such fluid-filled cracks will be aligned by stresses similar to cracks in brittle rock, and are expected to display similar stress-aligned shear-wave splitting. This paper examines the theoretical effects of such crack distributions. It appears that the degree of splitting and anisotropy of melt-filled cracks is very similar to that of liquid-filled cracks in brittle rock.