

Explosive instability due to 4-wave mixing

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It is known that an explosive instability can occur when nonlinear waves propagate in certain media that admit 3-wave mixing. The purpose of this paper is to show that explosive instabilities can occur even in media that admit no 3-wave mixing. Instead, the instability is caused by 4-wave mixing: four resonantly interacting wavetrains gain energy from a background, and all blow up in a finite time. Unlike singularities associated with self-focussing, these singularities can occur with no spatial structure - the waves blow up everywhere in space, simultaneously.