# Spectral instability for NLS equations on metric graphs

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*An orbital stability* of a solitary wave to a Hamiltonian model

$$\frac{du}{dt} = JE'(u(t)) \tag{1}$$

means that a solution to the Cauchy problem stays close to an orbit generated by the wave profile when an initial data is close to the profile.

It is commonly believed that the orbital instability of a solitary wave solution follows from exponential growth of a solution to a corresponding linearization of model (1).

The existence of such exponentially growing solutions frequently is called *a spectral instability.* Practically it means that the linearization operator $L$ has at least one eigenvalue with a positive real part. In particular, stability study mainly involves investigation of a spectrum of $L$.

We will discuss how to apply the Grillakis-Jones theory to establish the spectral instability for the standing wave solutions to nonlinear Schrödinger equations on star graphs. To do that we use the extension theory of symmetric operators and a generalization of the Sturm theory for star graphs. This theories are applied to a pair of self-adjoint operators associated with $L$.